The Magazine of Colorado School of Mines

MINES

Volume 92 Number 2
Spring 2002

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About Our Cover:

Boulder "storyteller" Susan Marie Frontczak travels the country, performing in a one-woman show on the life and work of Marie Curie, whose Nobel-prize winning research on radioactivity reached its 100th anniversary in April. She is pictured with students J. Paul Chambers and Bonnie McCoy. More on page 5. *Photo by Tom Cooper.*

MINES
SPRING 2002
Mines is published quarterly by the Colorado School of Mines and the CSM Alumni Association for alumni and friends of the School. The magazine is a merger of *Mines Magazine* (founded in 1910) and *Mines Today* (founded in 1986). The merger took place in 2000.

Comments and suggestions are welcome. Contact us by writing to MINES, P.O. Box 1410, Golden, CO 80402; or call 303-273-3294 or 800-446-9488, ext. 3294, between 8 a.m. and 5 p.m., M-F, MST; or email *magazine@mines.edu.*

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Letters to the Editor

A grand place for the curious

I can recall, fondly, several untalented professors at Mines during my study years there, skipping the M.S. on my way to the D.Sc. The School of Mines in Alaska (my B.S. site) was 100 percent in that department, and New Mexico Tech (three years on that campus) had a few foreign-born instructors who grunted through entire semesters. I picked my profs at the University of New Mexico and at Boulder between classes at Socorro and Golden.

But there's so much more to college education than instructor ability. The excitement I felt at Mines, coming out of industry to test the depth of my understanding, struck me the moment I met the first professor, Hildreth Frost Jr. in the Met department. The place was full of teachers who had done difficult things, even if they couldn't sweep me off my feet talking about it.

"Can I do this?" was my big question at Mines. I asked everyone, from President Orlo Childs to Al Pierce in his Met basement office. The answer was always, "You don't know until you try." For me, the campus was richer than King Solomon's mines. The traditions were deep and priceless. The buildings were mills that continuously accepted raw ore and produced world-class concentrates. A grand place for a curious person.

When we had a teacher who fell asleep or who put us to sleep, we students got together to teach each other. Everything was there: books, energy, ambition, hope and history. The aura of Mines cannot teach, but it certainly makes learning a readily approachable quest.

Ralph E. Pray DSc Met '66

Time for reunions

In an effort to encourage my classmates to attend our 60th Reunion in 2002, I was also looking ahead to 2007. Plan now, I wrote them! My friend, Al Brookes, '36, succeeded in getting some of his classmates and others to attend their 65th, and they had a good time as seen in this photo. Al is probably looking forward for their 70th and he hopes to have a yearly reunion until then.

Roland B. Fischer Met E '42

Class of '36, front row from left: Chuck Earlougher, Al Brooks, John Traylor, Kenneth Fenwick. Back row: Jack Pardee, Tom Snedeker, Bob France.

Schoolcraft is his hero

What a surprise to find a write-up on one of my heroes, Michigan's Henry Rowe Schoolcraft, in my college's magazine ("From the Archive: The first book written on Western frontier mining, Vol. 91, No. 1)! I'll bet not many CSM alumni knew who he was before reading your article.

James C. Woodruff Geol Eng '48

Who's who?

I've noticed that a helpful thing we had always had in the *Mines Magazine* no longer exists in this new publication. I think what the new publication needs is the usual column of the CSMAA officers, directors, staff, and address and telephone listings. There is a personnel listing in the new one but not for the Alumni Association itself. I think it should be included in each issue since it cannot be found anywhere else that I know of, except maybe the CSMAA letterhead.

Van Howbert Geol E '51, Hon Mem '87

Editor's note: We have added the staff and directors names on page 34, Staying Connected.

Women are growing on Mines

By Leah Kolt

Susan Marie Frontczak portrays Marie Curie at the WISEM Chevron Lecture in March. See www.storysmith.org.

CSM had a higher percentage of women than many other engineering schools for the academic year 1999 to 2000, including the Georgia Institute of Technology, Rensselaer Polytechnic Institute, and Johns Hopkins University. The national average was 19.5 percent. Mines was 25 percent.

This year, the percent of total female students as a percent of total student population grew to 25.8 percent. And applications from females for fall 2002 are strong – with the number of female freshman applications almost double what they were this time last year.

CSM has the highest total of female students and the higher percent of female students of all the Colorado engineering institutions, per 1999 to 2000 data.

In 2000 to 2001, CSM graduated the highest number of females in the history of the school at both the bachelor's and master's levels. Almost one-third of the recipients of graduate degrees were international female students.

Ask the students what they attribute this increase to, and many will cite the strong support system for women students on campus, including the Office of Women in Science, Engineering and Mathematics (WISEM) and the Society of Women Engineers (SWE).

WISEM brings successful women engineers to campus for lectures – including a storyteller portraying Marie Cure (see photo to left). It also matches students with mentors nationwide and has obtained National Science Foundation funding for retention of women and minorities on campus. For more information, go to mines.edu/Academic/affairs/wisem/.

The Mines SWE chapter was named the Best Student Section in the region at the SWE National Conference in Denver last summer. It is the fourth largest chapter in the nation, with 42 percent of the undergraduate women at CSM participating. It is also the largest professional association on campus.

SWE does everything from sponsoring Evenings with Industry – matching corporate representatives with interested students by major – to presenting a rose to each female graduate. A recent survey on SWE's value yielded an array of responses from the students:

Frontczak, a scientist herself, chats with CSM students Tara Sistko and Laine Blumer.

"SWE is my weekly shot of encouragement."

"Comforting, confidence-building, helpful."

"Awesome, fun, exciting."

"Hearing the life experiences of professionals gives me an idea of what I might like to do after school."

"At the ice cream social, I learned my teachers are human."

"SWE provides role models, not necessarily older women but the upper-class girls themselves who make everything happen."

"SWE has encouraged me to keep going when classes get hard and I want to give up."

One student especially appreciates the opportunities for outreach, with both young girls and professionals. "I want to share my excitement with others," she said.

For more information, go to mines.edu/Stu_life/organmines.edu/Stu_life/organ/swe/.

...and Mines is growing on women

Name: **Jessica Tylick**
Hometown: Lakewood, Colo.
Classification: Junior, chemical engineering

Why Mines? First, having grown up less than 15 minutes away from the school, I had the chance to hear a lot about the School's wonderful reputation. I also heard a lot about the endless opportunities that exist after you finish your undergraduate degree at Mines. My second reason, not the best reason, was that I'm a skier and I didn't want to give up the mountains. I didn't realize at the time that I wouldn't really have that much time to go skiing. Third, my mother begged me to come to Mines.

Met your expectations? I knew that the school was going to be hard and it definitely has been that way. On a positive note, I really didn't expect the professors to be as helpful as they are. Our focus is so much on school that I'm worried that I'm going to look back some day and regret not getting a chance to do more things or having more chances to hang out with friends.

Do you have a mentor? I have an adviser on campus but I talk a lot more to other individuals when I have questions or need help. I have a couple of engineers from industry I talk with regularly, but I would have to say the best mentor or adviser I have is my mother. She has been there for me every step of the way and helps me put things in perspective.

Most important lesson learned? Go out and take advantage of what life has to offer. Take chances, take risks. Do whatever it takes to get to where you want to go. Don't worry about what others think.

Why chemical engineering? Because out of all of the engineering fields, it seemed like the broadest. I have always wanted to go to medical school and, just in case things didn't work out, I wanted to have a good backup. Also, it only required two semesters of physics, not three.

Plans after graduation? After I graduate I would like to go to medical school or get my graduate degree in biomedical engineering. I also definitely want to start a family and travel the world for a little bit.

Name: **Tara Sistko**
Hometown: Arvada, Colo.
Classification: Senior, engineering with a specialty in mechanical

Why Mines? I thought it would give me a better hands-on experience with engineering. The EPICS program seemed exciting. I was able to design and build my freshman year.

Met your expectations? It depends on what day you talk to me. The senior design program has been a disappointment for me, but I think I am an exception. Overall, this school has taught me many of the things I expected to learn.

Do you have a mentor? I have a career mentor on campus. SWE adviser Louise Wildeman has helped me to grow as a person and think quickly. She has also been supportive in my career search. Having someone who is not my parent to help me make some decisions has been very helpful. Sometimes you just need an unbiased opinion on things.

Most important lesson learned? How to solve problems on my feet. How to fix a situation as quickly as possible, even when an ideal solution does not seem possible. I learned most of this through SWE.

Why mechanical engineering? I thought it would be the broadest field in engineering. I could do whatever I wanted with my degree. I still believe this is possible.

Plans after graduation? An engineering job in manufacturing, design or consulting.

Name: **Barbra Maher**
Hometown: I grew up in Houston, Texas, but I call Littleton, Colo., home now.
Classification: Ph.D. candidate in geophysics

Why Mines? When I decided to return to school for a Ph.D., I knew what I wanted to pursue for my research. There were only two possible schools that offered the faculty and expertise in that subject, and Mines was one of them. I was accepted to both schools; however, it was more feasible for my husband to get a job in Denver (he is also a geophysicist), so I chose Mines. I had not even visited the campus prior to accepting, only spoken with faculty members on the phone.

Met your expectations? Interesting question. The only thing I could base my expectations on was my prior experience getting a master's degree at University of Arizona. I had some idea what to expect from a graduate program – classes, research and hard work. My expectations were met in those areas. But so many other unexpected things have happened along the way during my six years here, both good and bad.

Do you have a mentor? I have an industry mentor through the Women in Geophysics Mentoring Program. This has helped me, particularly when I have needed a sounding board who was not a part of the department. I have had several unofficial mentors on campus who have helped my personal and professional development immensely. I think mentors are vital to success.




Young girls take an interest in science and engineering when they attend the Expanding Your Horizons weekend at Mines, sponsored by the School and the Department of Energy's National Renewable Energy Laboratory in Golden.

Most important lesson learned? How important it is to forge relationships with people all across campus – students, faculty, administrators and staff. Graduate school is not just about research and academics, it is about becoming a contributing member of a community. Each student has an important role to play in making this institution better than it was when we arrived.

Why geophysics, with a minor in geology? My dissertation is a study of induced microseismicity associated with enhanced oil recovery methods. This work grew out of a project I was involved in at Los Alamos National Laboratory, which I wanted to continue as a Ph.D. project.

Plans after graduation? I have been doing some adjunct teaching as I am moving closer to graduation, and this has helped me realize that I enjoy teaching at the college level. Since I have two young children, I will be looking for part-time positions in the short term. Eventually, I would like to pursue a tenure-track position at a university.

Name: **Ruth Tinnacher**
Home town: Graz, Austria
Major: Ph.D. candidate, environmental science & engineering

Why Mines? I came here as an exchange student in 1997 planning to stay for five months. Instead, I will be here for about five years...and instead of doing an exchange semester only, I already got a master's degree and will hopefully also finish a Ph.D. The most important reason for me staying here was the friendly, motivating and, at the same time, very challenging working environment.

Met your expectations? In most things, yes. But in Europe people do not normally expect that you work most of the weekends. You are rather considered inefficiently working if you do that.

Do you have a mentor? I have an email mentor from MentorNet.com who is very helpful, because sometimes women need female advice.

Most important lesson learned? From my exchange semester: I can live in any country of the world where I can learn the language within one year. From my research here: You have to take care of yourself, because nobody else can do that for you (know how much work you can do and don't work more than you can).

Why environmental science and engineering? Broad field of natural sciences applied (from fluid mechanics to chemistry and biology), work that makes me feel good, because I can help improve the environment.

Plans after graduation? A combination of teaching/research and consulting. However, I don't know yet where to set priorities...

Name: **Miki Ushijima**
Home town: Aurora, Colo.
Major: Freshman, mathematical & computer sciences

Why Mines? Because I enjoyed math and science and I knew I would get a quality education in these two areas here at Mines.

Met your expectations? Yes, in ways. I always heard horror stories about Mines, but it is not too bad as I imagined. It is still challenging, but it is not impossible.

Do you have a mentor? Yes, I am fortunate. My Sigma Kappa sorority sisters are a great social support, and I have two (technically one) great mentors from CSM 101. I am also comfortable going up to some of the faculty members here at Mines, such as WISEM Director Deb Lasich, to get assistance. Faculty mentors are great when you have questions on academic and career direction. Mentors of the same age are a different story. They share the same stress, and they can help you get through all of this. I don't see how anyone can maintain their sanity without these support systems. If I didn't have them, I would be crushed with loneliness, confusion and pressure.

Most important lesson learned? There is a lot more to growing up and becoming an adult than seeing another candle lit on your birthday cake.

Why mathematical and computer sciences? I was always interested in software design and mathematics, and this major compensated for both sides. I am not sure if I will stick to this all the way though.

Plans after graduation? Get a job in the first place. Haven't really thought about it too far ahead, but I've had (and will have one this summer too) an internship at IBM, so I'll get a good idea what mathematicians, comp scientists and engineers get to do in the corporate world. I'm also considering teaching someday when I'm crusty and old :)

Volcanoes in America's

By Barbara and **Bob Decker DSc Geol '53**

*Authors **Bob Decker '53** and his wife Barbara live in Hawaii.*

If you had to guess how many of America's national parks and monuments have volcanoes as their central theme, or in a major supporting role, how many would you say? Ten? Twenty? Thirty?

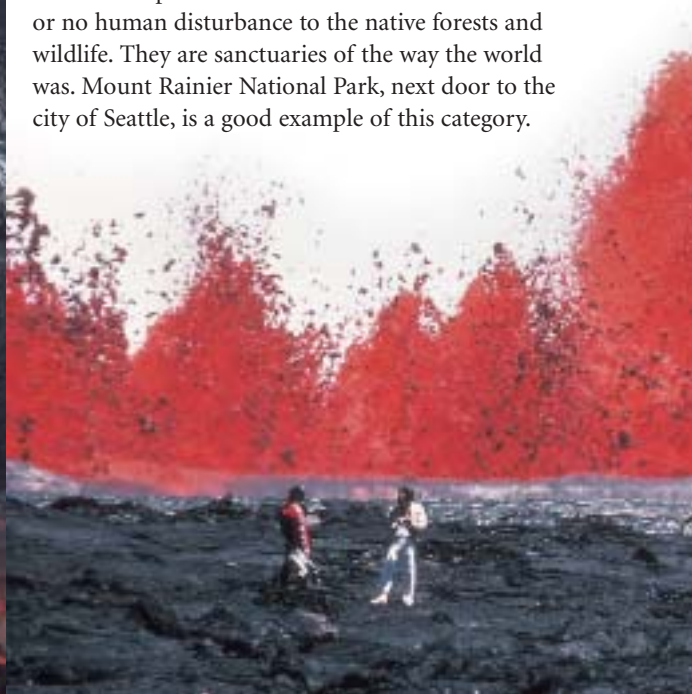
The answer is at least 38; 20 where volcanoes are the main theme, and 18 or more where volcanoes have major supporting roles. We have been interested in volcanoes for many years, but this large number surprised even us. After thinking about it, we can see three main reasons why volcanoes are the stars, or major supporting players, of so many places in America's national park system.

First, volcanic eruptions are rare, awesome and fascinating. They are symbolic of the power of nature. Thirty-five volcanoes in the United States have erupted one or more times during the 20th century: Kilauea and Mauna Loa in Hawaii, Mount St. Helens in Washington State, Lassen Peak in California, and 31 others in Alaska, including Katmai, whose eruption in 1912 was the largest in the world in the 20th century. All four of the volcanoes that have erupted since AD 1900 in Hawaii, Washington, and California—and six more in Alaska—are in national parks or monuments.

Sleeping volcanoes that have erupted during the past 100,000 years but not during the 20th century number somewhere between 100 and 200 in the United States, depending on who is counting. Many of these dormant volcanoes, for example Haleakala on the island of Maui, are also in national parks. Going way back in time, about a 100 million years, what are now the granite domes and cliffs of Yosemite were once chambers of molten rock feeding a chain of volcanoes that have long since eroded away.

The second reason is that volcanoes, erupting or sleeping, are beautiful and majestic mountains, and are often in pristine areas where there has been little or no human disturbance to the native forests and wildlife. They are sanctuaries of the way the world was. Mount Rainier National Park, next door to the city of Seattle, is a good example of this category.

Pu'u O'o vent, Kilauea Volcano in Hawaii began erupting in 1983 and is still pouring out molten lava.



National Parks

The steaming lava dome inside the crater of Mt. Saint Helens can be seen in this 1982 photo, taken from across Spirit Lake.

Thirdly, unique thermal features like the world-famous geysers of Yellowstone National Park in Wyoming, and the wild and wonderful volcanic rock outcrops in Arizona's Chiricahua National Monument are rare and fascinating natural wonders.

Our book is centered on volcanoes, but each place we write about is rich in other wonders—history, scenery, wild flora and fauna. If we tried to describe it all you wouldn't be able to lift our book. We hope you'll go see the volcanoes, and discover each park's other treasures for yourself.

Volcanoes have their roots deep below the surface, and blast their ashes high into the sky. Discovering how they work helps us understand our dynamic Earth, and seeing and studying them in our national parks is both an education and a delight.

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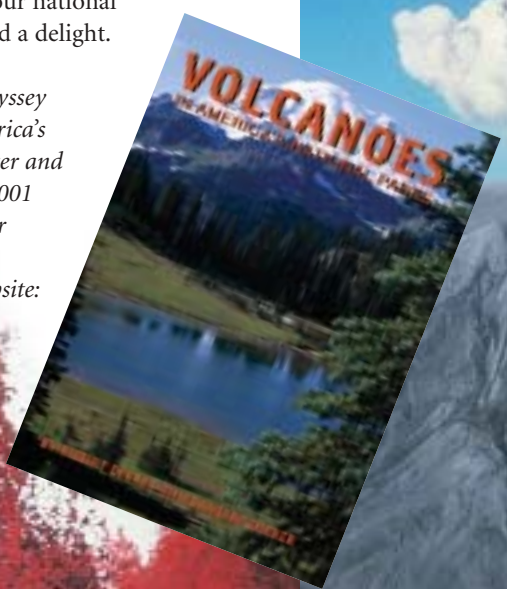
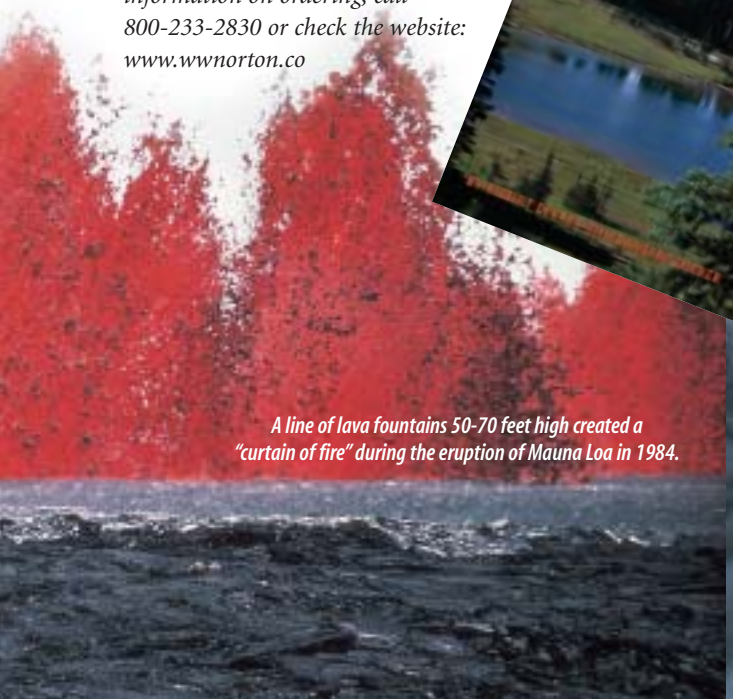




A line of lava fountains 50-70 feet high created a "curtain of fire" during the eruption of Mauna Loa in 1984.

The explosion from the July 1980 eruption of Mount St. Helens looked impressive, but its volume was much smaller than the huge eruption of May 18, 1980. Lava domes that grew in the crater during the summer and fall were blown out by such smaller explosions.

Short takes

Carnegie Foundation's Kelly Macatangay

Carnegie Foundation Studies Programs at CSM

The organization that many believe "has written the book" about quality education is writing a new book. A team from the Carnegie Foundation for the Advancement of Teaching was in Golden this winter to study programs at CSM for the upcoming book, which will address:

- Teaching and learning practices in U.S. engineering schools
- How the practices relate to the engineering profession
- What changes these practices imply for the future.

CSM is one of six institutions that the Carnegie Foundation team visited to gather information for their study. While on the CSM campus, the four-member team visited classes and talked with students and faculty members, as well as administrators. They focused on electrical, mechanical, environmental and biological engineering topics.

The engineering study is conducted in conjunction with the Carnegie Foundation's Preparations for the Professions Program.

Departmental Name Change

In February, the CSM Board of Trustees approved changing the name of the Chemical Engineering and Petroleum Refining Department to the Chemical Engineering Department.

Tilton Delivers Lecture

John E. Tilton, this year's Faculty Senate Distinguished Lecturer, spoke in February to the community on "Living on Borrowed Time? Modern Civilization and the Threat of Mineral Depletion."

Tilton is the William J. Coulter Professor of Mineral Economics at Mines. His teaching and research interests over the past 30 years have focused on economic and policy issues associated with the metal industries and markets.

The Faculty Senate Distinguished Lecturer Series, which began in 1990, gives the CSM faculty the opportunity to recognize one of their outstanding colleagues. They select a lecturer who embodies qualities respected and admired in a faculty member, as well as one who has stimulating ideas to convey and an ability to communicate those ideas effectively.

Dr. John E. Tilton

Exemplary Institution Designation

Since legislative approval of Mines as an "exemplary institution" last year, CSM and the Colorado Commission on Higher Education have negotiated a performance agreement, approved by the CSM Board of Trustees.

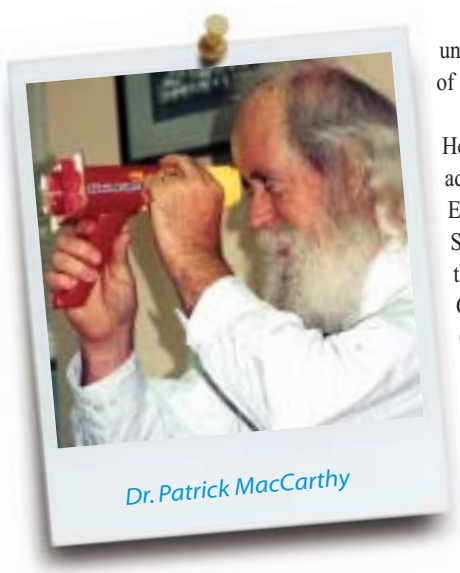
Some of the key elements of the agreement address:

- Student enrollment, transfer, retention and graduation rates
- Programs specifically designed to assist students in achieving their academic goal
- Student performance on national examinations
- Student satisfaction
- Student performance after graduation
- Assessment of the quality of academic programs
- Credit limitations for academic degree programs
- General education course competencies (House Bill 1263)

MacCarthy Addresses Conferences

Dr. Patrick MacCarthy of the Chemistry and Geochemistry Department presented a lecture entitled "Inventing, Patenting and Licensing" at the 2002 NSF Design, Service and Manufacturing Grantees and Research Conference held in January in San Juan, Puerto Rico.

In February, MacCarthy was an invited speaker at the Rocky Mountain Inventors Congress annual conference held at CSM, where he spoke on the subtleties underlying the legal meaning of "invention."



Dr. Patrick MacCarthy

He delivered the keynote address at the Fifth Annual Environmental Chemistry Symposium, sponsored by the Environmental Chemistry and Geochemistry Program at Pennsylvania State University in March, speaking on "Humic Substances – The Practical and Intellectual Challenges." MacCarthy also delivered the closing address, entitled "Heterogeneity in Humic Substances – An Ecological Necessity?

In July, MacCarthy will be a keynote speaker at the International Humic Substances Society biennial meeting held in Boston.

SHORT STAKES

- Facilities master plan and capital construction
- Financial support increase
- Commitment to student financial aid
- Funds in relation to resident enrollment
- Tuition rates
- Creation, modification or elimination of academic degree programs
- Quality Assurance Act
- Advisory Board to the CSM Board of Trustees.

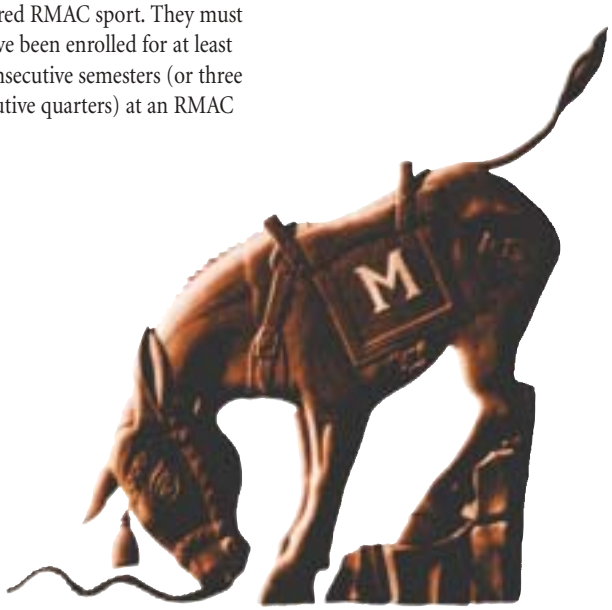
See www.leg.state.co.us/2001/inetcbill.nsf/fsbillcont/B2F0D7411E21A61E87256A3200740ACB?Open&file=229 enr.pdf for further information about the bill.

Student Athletes Honored

CSM led all Rocky Mountain Athletic Conference (RMAC) schools with 25 student athletes named to the conference's list of fall 2001 academic award winners. The student athletes achieved an overall cumulative GPA of 2.94, with 43 percent of student athletes achieving a cumulative GPA of 3.0 or above.

The students were recognized in March at a student athlete academic awards luncheon sponsored by CSM and Wells Fargo Bank, Golden.

To be eligible, a student athlete must maintain a minimum 3.20 grade point average and be a starter or key reserve for a championship-sponsored RMAC sport. They must also have been enrolled for at least two consecutive semesters (or three consecutive quarters) at an RMAC school.



Short takes

Gale A. Norton Keynotes Spring Commencement

Secretary of the U.S. Department of the Interior Gale A. Norton delivered the keynote address at the 128th annual commencement on May 3, 2002. Norton is the first female to head the 153-year-old agency. She served as Attorney General of Colorado from 1991 to 1999.

Gale A. Norton

Honorary Degrees

- Gale A. Norton, U. S. Secretary of the Interior

- William H. Erickson, retired Colorado Supreme Court justice

- Dr. Jack B. Howard, Hoyt C. Hottel Professor in the Department of Chemical Engineering at the Massachusetts Institute of Technology.

Distinguished Achievement Medals

- Dyke Howell, retired president and CEO of Frontier-Kemper Constructors, Inc. (FKCI)

- Dr. Keith A. Kvenvolden, senior scientist, U. S. Geological Survey's Coastal and Marine Geology Team

Shoham Makes Presentation

Dr. Yoram Shoham, vice president of external technology relations for Shell International Exploration and Production, Inc., gave a special presentation on "Energy Globalization and the Emerging Technology Renaissance" at CSM in February.

For the future, he predicts that "fierce global hyper-competition, too many players, too much money, and too few resources" will create an environment "where technology will make a huge difference." He foresees "smart wells that almost grow organically" and "intelligent oil fields."

Offshore oil platform

The event was sponsored by the CSM Office of Academic Affairs.

Platform superimposed over Houston skyline

Community Leadership Forums

"Ten Trends Profoundly Impacting Education & Society" was the topic of discussion this winter at the first Community Leadership Forum held at Chatfield High School in Littleton. Jefferson County Public Schools, with partners including CSM, will host a series of public forums, featuring a variety of topics, speakers and panelists. Other partners

■ Dan McFadden, retired vice president and construction manager of FKCI.

Rhodochrosite

Rhodochrosite Designated State Mineral

Gov. Bill Owens in April signed into law a bill to make rhodochrosite Colorado's official mineral.

The idea to elevate rhodochrosite to state mineral status came from John Ghist's earth science class at Platte Canyon High School in Bailey.

CSM President John U. Trefny said he wished he had thought of the idea first.

CSM alumnus Brian Lees, owner of the Sweet Home Mine in Park County, where one of the largest, purest veins lies, said the crystal was formed 31 million years ago. It was once ground up for use as face powder, he said. Early last century, miners discarded it as they were digging for silver.

Currently, museums from Washington, D.C., to Paris have exhibits of Colorado rhodochrosite on display.

SHORT STAKES

in the series, initiated in response to September 11, are Hanifen-Imhoff, Jefferson Foundation, LMC Community Foundation, National Renewable Energy Laboratory and Red Rocks Community College.

Dr. Jane Hammond, superintendent, Jefferson County Public Schools, and President John U. Trefny

Connected Learning Community Award

President John U. Trefny and the Administrative Faculty Council at CSM established the Connected Learning Comunity Award to recognize administrative faculty members who have demonstrated and modeled in their work at CSM the concepts of the connected learning community. Tim Cake, director of Plant Facilities, and Melody Francisco, short course manager of Special Programs and Continuing Education, each received a $500 award at the spring 2002 administrative faculty luncheon. The awards are intended for professional development activities such as conferences, training, books and publications.

Tim Cake, President John U. Trefny

Nyikos Appointed to CSM Board

Gov. Owens appointed Michael S. Nyikos of Grand Junction, Colo., to the CSM Board of Trustees, effective March 24, 2002.

The vice president of institutional advancement at Mesa State College in Grand Junction from 1989-93, he served as vice president of student affairs and external relations at CSM from 1979-89. From 1970-79, he was dean of student affairs at Fort Lewis College in Durango, Colo.

A graduate of New Mexico Highlands University, he also holds a master's degree and a Ph.D. from the University of Michigan, where he served as assistant director of student services.

Michael S. Nyikos

A congressional campaign consultant, he serves on the National Junior College World Series Tournament Committee and on the board of directors for the Denver PBS station KRMA-TV.

The governor appoints the seven-member Mines board for four-year terms.

NSF CAREER Awards

Engineering Associate Professor Marcelo Godoy Simoes and Engineering Assistant Professor Tyrone L. Vincent are recent recipients of the National Science Foundation (NSF) Faculty Early Career Development (CAREER) Awards.

The CAREER Program offers the NSF's most prestigious awards for new faculty. The program recognizes and supports the early career development activities of those faculty members who are most likely to become the academic leaders of the 21st century.

SHORT STAKES

Participants in Society of Petroleum Engineers Meeting

Assistant Energy Secretary Speaks at SPE Dinner

Mike Smith (second from left in photo), assistant secretary in the Office of Fossil Energy at the Department of Energy, addressed the annual joint meeting of the Denver Society of Petroleum Engineers and the Mines student chapter.

His campus hosts included President Trefny and petroleum engineering students Kai Binkley, SPE student chapter president, and Ryan Helmer.

Project Bookshare Builds Bridge with Thailand

Fifty years of *Analytical Chemistry* could have ended up in a dumpster, but Dr. Kim Williams of the Chemistry and Geochemistry Department had an idea.

She donated the journal collection, along with other faculty contributions, to a university in Thailand, where she was born and raised.

In the process of seeking funding to ship the books, Williams found Dr. Joyce Torio and "Project Bookshare" at the American Chemical Society's (ACS) Office of International Activities in Washington, D.C. Dr. Torio and the ACS not only accepted the fiscal responsibility of shipping the books to Thailand, they also organized a supplement to the project spearheaded by Williams.

Williams located a professor at Mahidol University who agreed to accept the responsibility as receiver of the 507-carton, 40,000-pound shipment in October.

Dr. Williams' goal is to develop relationships between CSM and higher education institutions in Thailand. This year the department hosted its first Ph.D. student from Chiangmai University.

Not So Shocking...

New design may improve shock-absorbing barriers for buildings and space vehicles

By Misti Brady

A safer world is not far off because of CSM researchers Masami Nakagawa, associate professor of Mining Engineering and NASA IPA Fellow, and David Wu, assistant professor of chemistry and geochemistry and of chemical engineering.

Researchers from Mines, NASA and the University of New York at Buffalo have developed and verified a theory that allows scientists to adjust the mass distribution in an object, to control when and how the energy of an impact arrives. This principle can be used to design improved shock-absorbing barriers.

David Wu, Thomas Miller and Masami Nakagawa

In collaboration with NASA, CSM has helped theorist Surajit Sen of the University of New York at Buffalo verify and apply his prediction.

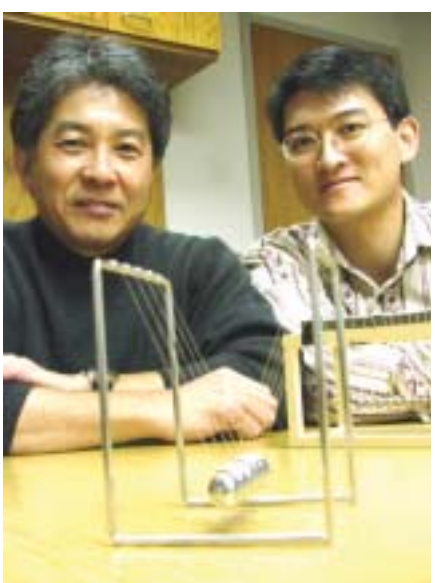
"Imagine a pool table, when a cue ball strikes another ball of the same mass. The cue ball stops and the other ball takes off, therefore transferring all its energy to the second ball. Now consider a cue ball hitting another ball with slightly less mass. While the majority of the energy is transferred to the second ball, the cue ball drifts forward, retaining a small amount of kinetic energy. When this process of incomplete energy transfer is iterated through sequential collisions in a chain of balls with diminishing mass, an initial single impulse will eventually be converted to a collection of impulses with small kinetic energy," said Wu.

According to Nakagawa, arranging particles in a tapered order can reduce the impact of an object by up to 95 percent.

This theory may allow engineers to shock-proof objects such as:
- Building walls
- Car racing tracks
- Foundations for earthquake resisting buildings
- Space station and other space vehicles.

CSM researchers are also taking a lead on small-scale applications of this mechanism. "We can build small shock absorbers to be mounted on various smart micro-and nano-machines," added Nakagawa. "Small-scale tapered chains may be used as shock absorbers in space, because there's no liquid, no gas, and they're durable in a harsh environment.

"Biomedical applications of this principle are under investigation. One potential application is an artificial bone or joint that absorbs up to 90 percent of the impact. The applications for this new technology are endless."



Nakagawa and Wu display the popular desk toy that sparked the theory.

This research has recently been highlighted in the *Denver Business Journal, Front Range TechBiz Journal,* WB2 News of Denver, and KMGH-TV, Denver's ABC affiliate.

Engineers Improve the Human

From peg-legs to pacemakers, humans have engineered themselves for centuries. Joel M. Bach, assistant professor of engineering at CSM, is raising the quest for self-improvement to new heights. His work in biomechanics and biomedical engineering is improving the lives of many people, from disabled children and surgical patients to downhill skiers.

Helping Disabled Children Sit Tall

Children with severe cerebral palsy lose control of their muscles and sometimes the ability to sit upright, which can cause scoliosis. Bach, who is also an assistant professor and director of biomechanics research at the University of Colorado Health Sciences Center (UCHSC), studies better ways to help these children regain mobility. "It's a medically important problem that affects children's quality of life," Bach said.

The traditional solution is surgical implantation of a metal rod against the patient's spine. The rod is wired to the spine and fits into holes drilled in the pelvis. Ideally, the implant provides support long enough for the spinal bones to fuse and hold the child upright. However, the lowest pair of wires can fail before the bones fuse. When these wires fail, the rod is no longer tightly held to the spine and it slides inside the holes in the pelvis. A second traumatic surgery is required to correct the problem. Bach and Dr. Mark Erickson, a surgeon at The Children's Hospital (TCH), developed and evaluated a modified spinal implant that would resist failure and reduce the need for another surgery.

In the new implant, the two lowest wires holding the rod to the spine are replaced by a pedicle screw. The screw is drilled into the vertebra and clamped onto the support rod. The team tested the strength of this arrangement by fitting the spines of six cadavers with the all-wire implant and six others with the new implant. They measured displacement between the bone and the rod as stress was applied to the spine in different orientations.

The new implant outperformed the old. It provided 50 percent more stiffness (the ratio of load to amount of displacement) and withstood twice as much load before failing. The new implant is also successful because it does not increase the cost or complexity of surgery. "This technique minimizes the chance of complications," Bach said. "I don't think there's any downside to using it."

Bach's future research may involve adding more hardware to strengthen the implant, conducting studies using more specimens, and developing a computer model of the spine so that virtual experiments can be performed.

Measuring Twice, Cutting Once

Orthopedic surgery can be more of an art than a science. An operation is typically planned using two-dimensional X-rays and the surgeon's judgment. For example, a common hip surgery involves cutting a muscle away from the bone at one location and reattaching it to another. The surgeon examines X-rays of the hip and uses his or her experience to decide where to cut and where to reattach the muscle. The result may not be optimal, even with the best surgeon.

Bach applies stresses to the knee to determine how knee ligament injuries occur and how to prevent them.

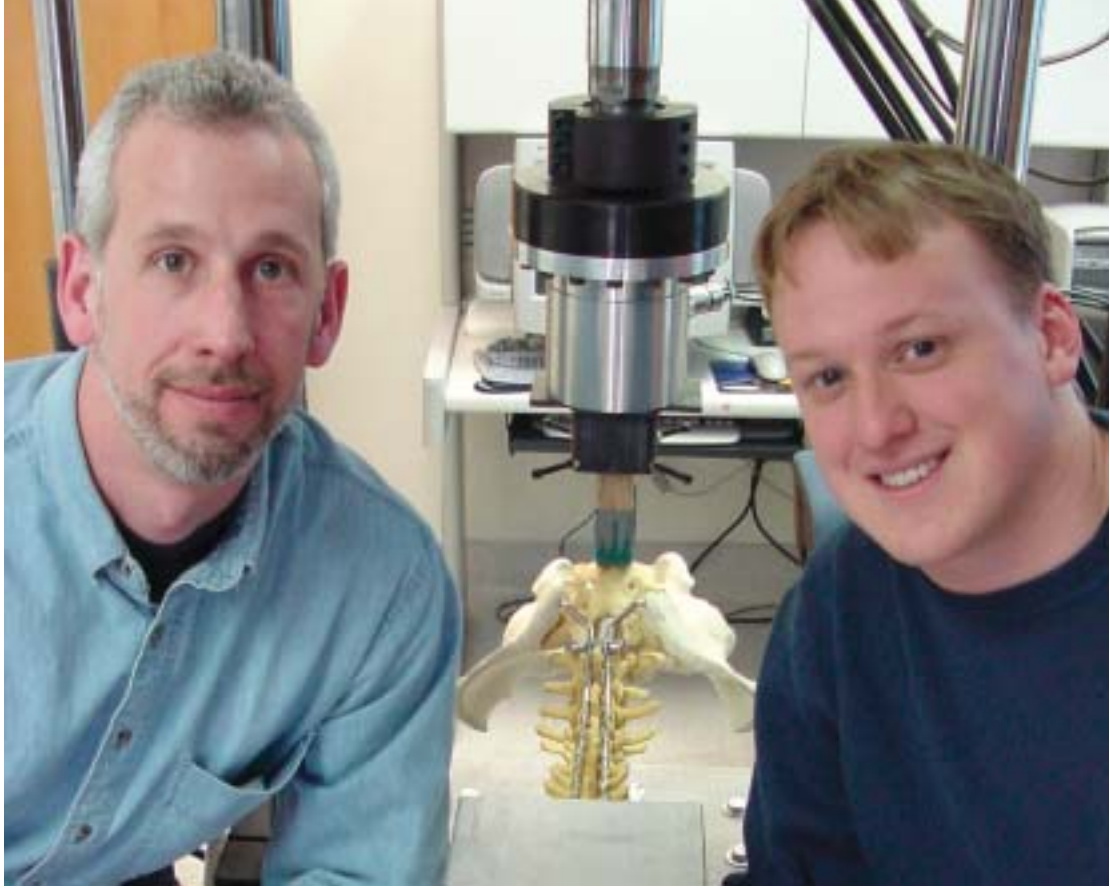
Bach and Dr. Robert Eilert, head of Orthopaedic Surgery at TCH, have written computer software that optimizes the surgical plan based on the biomechanics of the hip joint. Key points from the X-rays are collected, and the software calculates the geometry and forces that will result from different placements of the muscle. The surgeon is then able to choose the optimal configuration. Bach has completed software for two-dimensional optimization and is working on three-dimensional optimization.

Machine

By Jarett Zuboy

Planning surgery is one thing – performing surgery is another. "Orthopedic surgeons say they measure with a micrometer and cut with an axe," Bach said. Using a surgical navigation system can make surgeons more precise.

In these systems, sensors are attached to the surgical instruments and to the patient. Cameras monitor the sensors and show precise real-time positions of the instruments and patient. Such systems are currently designed only for a specific task, such as emplacing a bone screw, making them "quarter-million dollar screwdrivers," according to Bach. He aims to make surgical navigation systems more flexible by combining them with surgical planning software. The computer can guide the surgeon to match the engineering analysis, he said.



Dr. Joel Bach and CSM graduate student Luke Stumme study better ways to help children with cerebral palsy regain mobility.

There are several advantages to this approach. It is cost-effective because it allows the surgical navigation system to be used for numerous types of surgery. It allows surgeons to attain a high level of precision without using robots, which are not approved for use in the United States. It also makes remote surgery possible. A specialist could create an optimal surgical plan and transmit it to a less experienced surgeon, who could follow the plan while operating thousands of miles away.

Repairing Damage to the Human Body

Skiing at warp speed down a mogul-covered slope is great fun. Suffering a severe knee injury is not. Bach built a machine to apply different stresses to the knee to determine how knee ligament injuries occur and how to prevent them. The data from these tests is being used to design computerized ski bindings. The bindings will account for the height and weight of a skier, measure muscle contractions and stresses, and automatically release when knee failure is imminent.

A common method for repairing broken long bones, such as the femur, involves placement of a rod through the hollow bone. To place the rod, the surgeon must first ream out the bone, creating heat that can damage bone and tissue. Bach and Dr. Andrew Jonassen of UCHSC Orthopedics are working on a technique that measures the infrared light produced by heat, letting the surgeon know when to allow the bone to cool.

Bach and colleagues are also testing which methods of mending a bone fracture are best. They are evaluating whether knee airbags prevent injury during car accidents and researching ways to prevent occupational injury in the mining and petroleum industries.

Use granted by the Center for Human Simulation.

WOMEN'S BASKETBALL MAKES HISTORY

The Colorado School of Mines women's basketball team recently put the wraps on the most successful season in school history. Although the team lost in the first round of the Rocky Mountain Athletic Conference Tournament, nothing can take away from what these ladies accomplished during the 2001-2002 season. The Lady 'Diggers finished the season with an overall record of 16-11, the first winning season in the 25-year history of women's basketball at CSM. The women finished 10-9 in conference play. That record matches last season's RMAC record, and it is only the second time that a Mines women's basketball team has had a winning record in conference play.

The 2001-2002 season marked a significant year for Mines women's basketball in several respects. The Orediggers' victory over the University of Nebraska-Kearney on Feb. 21 was only the second victory over the Lopers in school history and the first since 1995. CSM also swept the season series against Colorado Christian University for the first time since 1988-89 when the Cougars were called Colorado Baptist. The ladies also defeated Chadron State College for only the fifth time in the school's 16-year rivalry with the Eagles.

Head coach Vic Doperalski deserves a great deal of credit for the Orediggers' success this season. Before coming to the school prior to the 1994-95 season, the team had an all-time record of 76-306, a .199 winning percentage in 17 years of competition. Since his arrival the team has a .355 winning percentage (86-156). In his tenure as coach of the women's basketball team at CSM, Doperalski has coached the only five teams to have ever won 11 or more games in a season. His teams are 40-40 over the last three seasons and have continued to improve in win totals since the 1998-99 season.

The 2001-2002 season also saw the conclusion of two brilliant careers. Senior forward Marissa Eichhorn was named a Second-Team All-RMAC selection in the Eastern Division. She finished her career as only the second player in school history to record more than 1,000 points and 600 rebounds in a career. She is the school leader in all-time 3-point field goals made, with 103 in 306 attempts. Eichhorn is second all-time in school history in rebounds with 683 and in steals with 239. She ranks fourth all-time in points scored with 1,147, and her 225 assists are the fourth most in school history.

Senior guard Reece Bollinger also had an outstanding year as she was named Honorable Mention All-RMAC in the Eastern Division. She is the single-season assist record holder with 130, and third all-time in career assists with 248. Bollinger is ranked third in school history with a 3-point percentage mark of .317, while she is fourth all-time in 3-point field goals made with 76.

In addition to the individual accomplishments of the 'Digger seniors, junior center Kim Good became the first Oredigger women's basketball player to be a first-team all-conference selection.

The team looks forward to a competitive season in 2002-2003. It appears the women's basketball program at Mines is on the rise.

By Ryan Herrman, Assistant Sports Information Director

'Diggers Finish 11th at Nationals

By Ryan Herrman, Assistant Sports Information Director

The Colorado School of Mines men's swim team enjoyed its most successful trip to the Division II National Championships in school history with an 11th place finish. The 'Diggers raced to five individual and five relay All-American performances en route to gathering 35 All-American certificates and 119 team points. All-American performances and certificates are given to any individual or team that finishes in the top 16 of an event. The National Championships were held in Orlando, Fla., and hosted by Rollins College March 13 to 16. CSM missed a top-10 finish by 21 points.

Sophomore Brian Pursley became the first Mines swimmer to win a national title, claiming the prize in the 100 Breast with a time of 55.94. Pursley, a Colorado Springs native, also finished third in the 200 Breast claiming wo of the teamís three top-five performances. He was also a member of the 200 Free Relay (14th), 400 Free Relay (9th), 800 Free Relay (12th) and the 400 Medley Relay (12th) making him a six-time All-American. Pursley also qualified for the U.S. Swimming Senior Nationals in the 100 and 200 Breast.

Brooks Masterson, a junior from Aurora, Colo., also made his mark as a six-time All-American. Masterson finished fifth in the 200 Fly and captured a ninth place finish in the 400 I.M. He joined Pursley, sophomore Shane Copsey and junior Ben Lichtwardt in the 400 Free, 800 Free and 400 Medley Relay events. Masterson was also a member of the 200 Medley Relay, with Copsey, Lichtwardt and junior Luke Berhardt, that finished 10th. The only relay event that Masterson did not compete in was the 200 Free.That team was comprised of Pursley, Copsey, Lichtwardt and Berhardt.

Shane Copsey added a 15th place finish in the 100 Breast with a time of 58.34 for the team's other individual All-American performance.

The season of firsts continued as sophomore Gretta Simpson from Grand Junction, Colo., became the first female swimmer from Mines to qualify for the National Championships .

"The most exciting thing about the season was that the school had its first swimming national champion and its first female qualifier," said Athletic Director Marv Kay. "This team worked very hard and the end results speak highly for their intense desire to be successful on a national level."

With all six members of this year's national championship contingency returning for competition next year, the Orediggers will look to continue the trend of excellence that made this season the best in school history.

Progressive vs. Aggressive

By James Preston Natland BSc Geol E '58

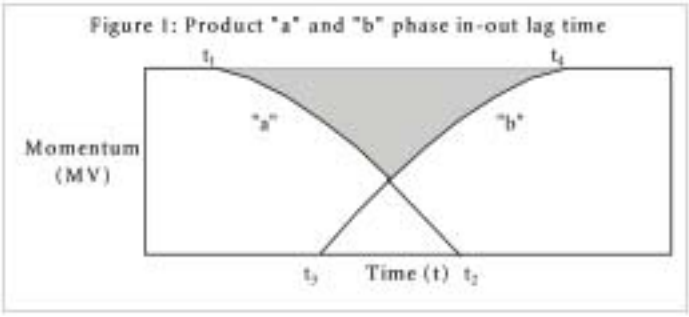
Editor's note: James Preston Natland wrote the following article in response to "The Next Generation of Energy: Fuel Cells," which appeared in the Fall 2001 issue of Mines. *He was associated with fuel-cell development for use in spacecraft having worked in the aerospace industry for 25 years, and believes the fuel cell battery systems are currently not cost effective to phase into the automotive industry. Below is his analysis of the difficulty for converting from gasoline-powered to a fuel cell-powered automotive vehicle.*

A program for product advancement and/or changeover to a new one can run into many unforeseen errors if action is taken too aggressively without consideration or knowledge of the world-market impacts.

A prime example in this rapid high-technology changing world is the fuel cell battery for motorized vehicle applications. Simple calculations using normal hydrogen and oxygen for fuel permits propelling a two-ton car 100 miles using 100 pounds of hydrogen and oxygen at 100 percent efficiency. Deuterium or tritium gives somewhat better mileage, but friction and accelerator problems will necessitate considerable unknown research and development efforts to debug the fuel cell battery concept.

Graphically and mathematically, this Product "a" and "b" technology transition can be illustrated as follows noting that "Progressive" and "Aggressive" activity are functions of "Velocity" and "Acceleration" respectively; thus, V= t/A, where A=unity=1, and V=t in the following illustrations:

Figure 1: Product "a" and "b" phase in-out lag time



Where product "a" is phased-out during $t_1 \rightarrow t_2$, and product "b" is phased-in during $t_3 \rightarrow t_4$, and the darkened area is the lag time involved.

The total Kinetic Energy (KE_{TL}) of this phase out → in period is:

$$KE_{TL} = \int_1^2 (M_a V_a)dt + \int_3^4 (M_b V_b)dt = M_{TL} V_{TL}^2 \qquad [1]$$

Noting that "V" does not equal the speed of light unless inter-product forces approach it.

The main error(s) in industry for achieving Product "a" and "b" phase-out →in harmony can be mathematically illustrated by summing the Food, Shelter, Communication (FSC) and Temperature, Pressure, Volume (TPV) functions for momentum activity during this period. Also, inter-product errors are added (e) to complete the momentum sum. The detail and/or accuracy of Equation 2 results are a function of individual or group TPV, FSC, and "e" analysis inputs:

$$\frac{d(M_a V_a)_{(TPV+FSC+e)}}{dt} = \left[\left(M_a \frac{dV_a}{dt}\right) + \left(V_a \frac{dM_a}{dt}\right)\right]_{T,P,V} + \qquad [2]$$

$$+\left[\left(M_a \frac{dV_a}{dt}\right) + \left(V_a \frac{dM_a}{dt}\right)\right]_{F,S,C} + \left[\left(M_a \frac{dV_a}{dt}\right) + \left(V_a \frac{dM_a}{dt}\right)\right]_{e_{TPV}, e_{FSC}, e_{1+2+3}}$$

Done for each product "a", "b", and "e" either as individual or group sums, and placed into a 3 x 3 matrix for simultaneous solution, inversion and unitizing analysis; noting that the inflection points, when $\frac{d(MV)_{TL}}{dt} = 0$, are equal to the t_1, t_2, t_3, t_4 values and

simultaneous solutions intercept is at $t_1 = t_4$ for optimum results:

$$\frac{d(MV)_{TL}}{dt} = \begin{vmatrix} \frac{d(M_a V_a)_{TPV}}{dt} & \frac{d(M_a V_a)_{FSC}}{dt} & \frac{d(M_a V_a)_e}{dt} \\ \frac{d(M_b V_b)_{TPV}}{dt} & \frac{d(M_b V_b)_{FSC}}{dt} & \frac{d(M_b V_b)_e}{dt} \\ \frac{d(M_e V_e)_{TPV}}{dt} & \frac{d(M_e V_e)_{FSC}}{dt} & \frac{d(M_e V_e)_e}{dt} \end{vmatrix} = 0, (t_1 = t_4)_{intercept} \qquad [3]$$

The unit matrix, from Equation 3 inversion analysis, is:

$$|M_{TL} V_{TL}| \cdot |M_{TL} V_{TL}|^{-1} = U_{M_{TL} V_{TL}} = 1 \qquad [4]$$

Technology Evolution

Equation 1 can be reduced to:

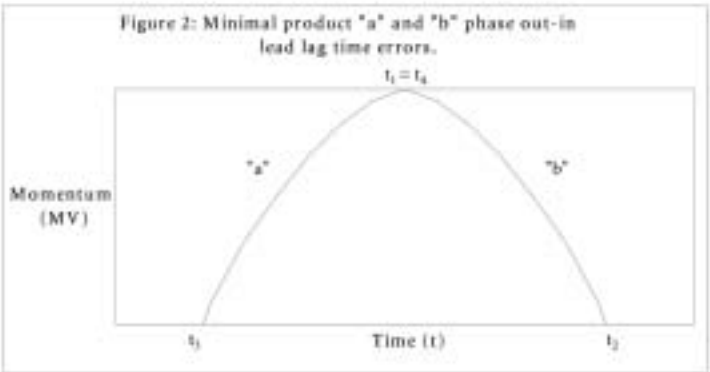
$$KE_{TL} = M_{TL}V_{TL}^2 = (M_{TL}V_{TL})\cdot(V_{TL}) \qquad [5]$$

And substituting $M_{TL}V_{TL} = 1$, and letting the KE_{TL} graphical inverse symmetry function inFigure 2 approximate the $|M_{TL}V_{TL}|^{-1}$ inverse matrix function of Equation 4:

$$KE_{TL} = V_{TL} = \frac{X_{TL}}{t_{TL}} \qquad [6]$$

By letting $t_1 = t_4$ in Figure 1, the products "a" and "b" time lag becomes a minimum, and transition is harmonious.

Figure 2: Minimal product "a" and "b" phase out-in lead lag time errors.



The best times to phase-in the fuel cell battery, and phase-out the gasoline engine, using the above equation analysis, are: Start phase-in "b" (t_3) at 2040, and take 10 years to arrive at t_4, then start phase-out of the gasoline engine at 2050 ($t_1 = t_4$), and take another 10 years to arrive at t_2 = 2060. This would lead to a progressive, harmonious transition period.

List of Terms:

X	=	The physical distance for product "a" and "b" activity during phase out→in period.
MV	=	Standard momentum terms of mass, velocity
TL	=	Total (used as subscript)
t	=	Time

By Misti Brady

From lunches of Wonder bread and grape jelly to video gaming to in-line skating, 11-year-old Colorado School of Mines student Dylan Jones blazes through life as a typical pre-teen… except for his classes in calculus, quantitative chemistry and data structures.

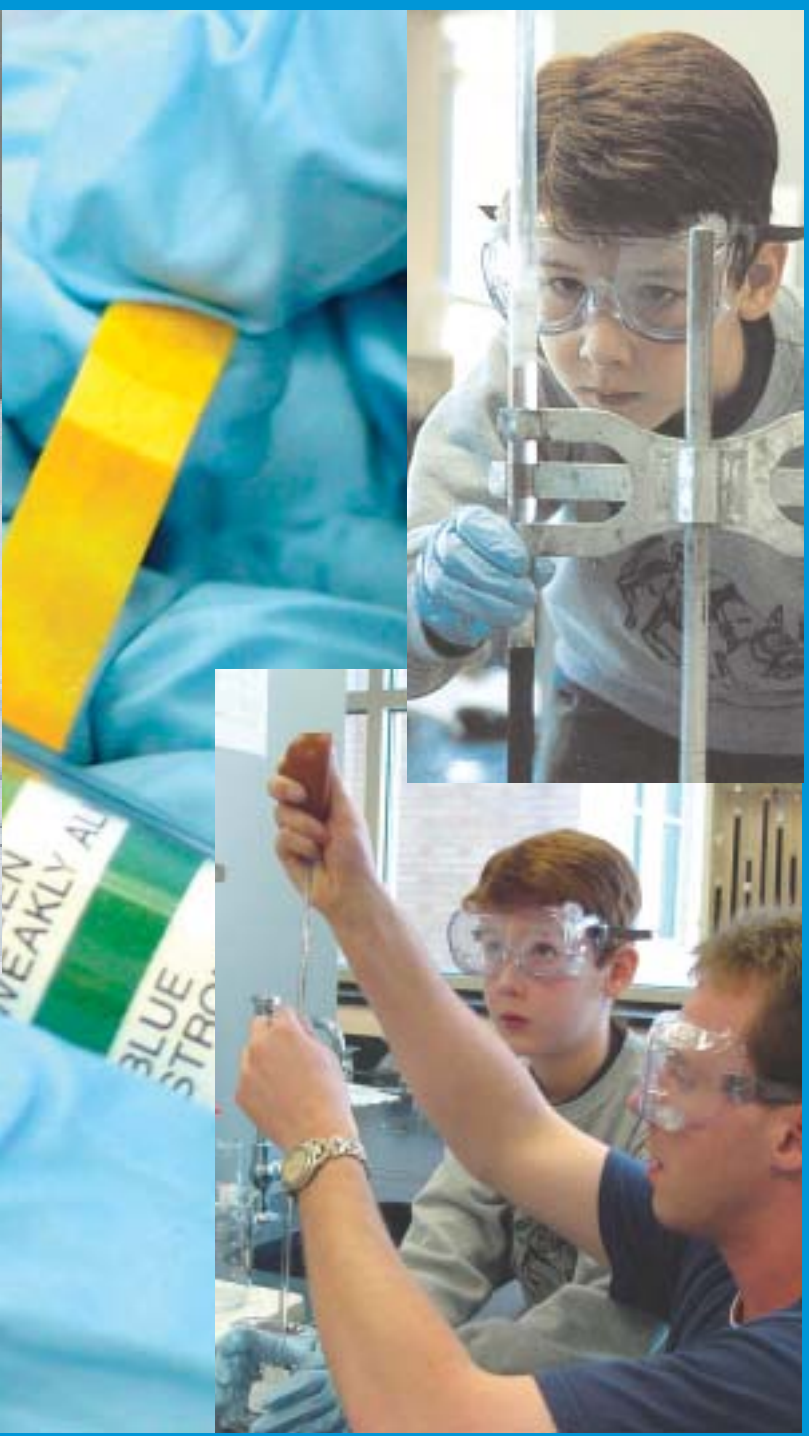
Enrolled as a part-time, non-degree student at CSM, he plans to major in chemistry or computer science or engineering or mathematics or maybe even medicine. Then he plans to launch a career as a concert pianist, neurosurgeon, NASA engineer, game programmer, mathematician or inventor. "At this pace I'll probably meet most of my goals," said Dylan. He has time.

"My number one career choice is becoming a neurosurgeon. I'm interested in how the brain works and how memory is stored and how the brain controls all the bodily functions and executes them," said Dylan. "My true goal is to make discoveries to help mankind. Neurosurgery is a field I want to pursue. There are lots of diseases that affect the brain. If someone has an accident and their brain is severely damaged, I want to discover something so they won't be handicapped for life…that would be really great!"

He began his adventure to become a CSM student by flying through several gifted schools, then getting bored with high school after a year. "Dylan pushed us," comments his mother Shari Jones. "We asked him what he wanted to do and he said, 'I want to go to college,' so the challenge then became ours to find an institution where he would be challenged. That search led us to Mines."

Dylan found what he was searching for at Mines. "I'm always looking for new things to learn. Last semester I did an extra project with my C++ professor, Dr. Tankelevich," said Dylan. "I've always been very interested in programming with 3-D objects…we built a robotic arm with two links using inverse kinematics. It was a real challenge."

Dylan received all A's his first semester last fall. "Dylan is a pleasure to have in class," said calculus professor Barbara Bath in the Department of Mathematical and Computer Sciences. She remembers Dylan's last day of calculus. "The students really learned to appreciate Dylan the last day of class, when he passed out handouts with pi to 500 decimal places and then proceeded to recite them while the students followed his progress."



Bath also recalls the day he came to calculus class without his homework done, because he was memorizing the *Guinness Book of World Records.*

His photographic memory has many benefits. Dylan's father Earl Jones, or "Daddy Blaster" as Dylan fondly refers to his book-carrier, attends class with his son to take notes. "I don't really use the notes. I'm glad I have them, but I remember everything that's on the board," said Dylan.

As Bath mentioned, another advantage to Dylan's memory is his recall of pi. He's able to recite the number sequence up to 501 decimal places and can also randomly select and recall specific digits. "Ummmm…number 326 after the decimal point is 2," said Jones. "It's fun. It didn't take long to learn, maybe about 20 minutes per 100 digits."

Dylan loves to play with his friends. "I really like video games. I have about 50 and have beaten every one but *Age of Empires.* It's really hard." His other hobbies include launching model rockets and extreme skating-rollerblading on the half-pipe. "I like rollerblading, because it's not like skateboarding – the wheels don't fall off your feet. I have lots of skating friends."

So what do they think of their college friend? "They think, hey, that's cool and it's no big deal. I'm one of the gang," said Dylan.

Dylan is extremely modest. "I truthfully don't know if I'm a genius. In my opinion a genius is someone who makes something or invents something or discovers something that helps mankind," said Dylan. "I don't think I've made a difference yet, but I'd like to make one by helping society realize that there are gifted children like me and you can't just stick them in public schools, because they probably won't do well and they'll go crazy with boredom."

He has an IQ of more than 200. The Jones family won't say what their son's exact IQ is. "We've been given a number. However, it's not accurate because he hit the ceiling on the test. Experts have a difficult time categorizing kids like Dylan who are nearly off the charts," said Earl Jones.

Dylan is in a category all his own.

Someday he may be another Einstein or Mozart, but right now what is important to him is to be Dylan and keep learning and dreaming.

Mines Hosts Ro

By Marsha Konegni

Twenty-five distinctly designed robots shared a singular goal: to win the 15th Annual International Walking Machine Competition.

In track, slalom and weightlifting events, 25 teams of collegiate competitors from North America tested the speed, strength and skill of their robots at Colorado School of Mines April 26 and 27. The Walking Machine Challenge was hosted by the Society of Automotive Engineers and CSM. After months of designing, building, testing and refining the capabilities of their robots, the teams provided spectators with an exciting exhibition—and a glimpse into the future.

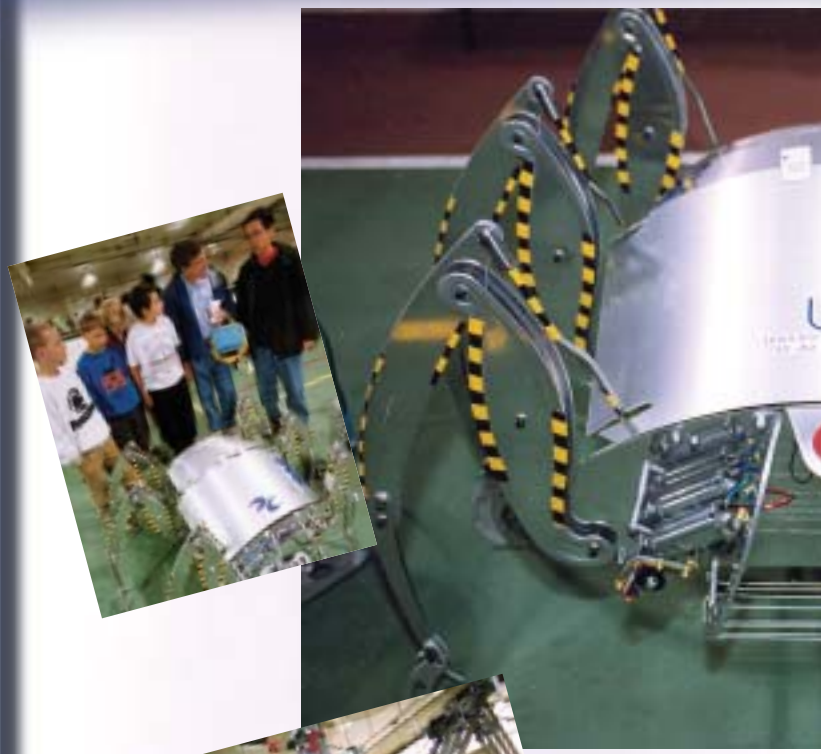
College students were in it for the fun, the chance of winning, and the possible discovery of new, important applications. After all, they knew that robots at Ground Zero in New York searched for survivors and helped rescue workers determine the safety of passageways through the rubble.

The international competition familiarized students with technologically advanced components and systems for the construction and development of robots, as well as other complex intelligent machines. Varied events tested the endurance and maneuverability of the machines.

Two Mines teams, three Colorado State University teams, and teams from across the United States, Canada and Mexico competed. Events included the dash, load, slalom, trip wire, object seek and obstacle course. In addition to the action events, judges awarded points for design presentations and design evaluations.

The winner? An eight-legged robot named "Black Widow," built by engineering students from LeTourneau University in Longview, Texas.

"The judges were impressed with 'Black Widow.' This was the first year a LeTourneau University team had entered the competition, and they came up with a very well executed design," said Dr. John Steele, CSM engineering professor and faculty adviser for the competition.



obot Olympics

School	Team Name
Binghamton University	Binghamton Bearcats
Colorado School of Mines	Blaster Robotics
Colorado School of Mines	Mines Minions
Colorado State University	The Ant
Colorado State University	Team Dysintegration
Colorado State University	Team Mike
Ecole De Technologie Superieure	Walking Machine ETS
Ecole Polytechnique De Aguascalientes	SAE Robotique
Florida Atlantic University	PrOWLers
Instituto Tecnologico De Aguascalientes	Galileus
Instituto Tecnologico De Aguascalientes	Quetzal 2
LeTourneau University	Black Widow
Milwaukee School of Engineering	Team WAMI
Northern Illinois University	NIU Robotics
Rice University	Robot Owls
San Jose State University	Area 141
Suny-Stony Brook	Team Stony Brook
Universidad Autonoma De Aquascalientes	Don Crus' Team
Universidad Autonoma De Aquascalientes	La Sociedad de los
Universidad Bonaterra	UBROBOTICA
Universidad Panamericana	Yolcatl
Universite Du Quebec a Rimouski	Rikilynx
University of California-Davis	Robotics 2002
University of Utah	1/4-20
Youngstown State University	JR Thunder

ROBOTS: MAN'S NEXT BEST FRIEND

CSM researchers develop robots for mines,

By Misti Brady

In the futuristic *Star Wars* and *Jetsons,* robots simplify the lives of humans.

"We're not far from having robots that vacuum our homes, take out the trash and walk our dogs," said Chris Debrunner, CSM assistant professor of engineering. "Some say it will be as soon as five years. Others say 30. I think it's somewhere in between."

According to Debrunner, researchers must overcome two primary problems to make a "helper robot" feasible. One current issue is that robots can hurt people. "We must teach them how to react safely among humans," said Debrunner. "Also, robots must have the ability to learn, understand and complete the tasks they are given."

Associate Professor Marcelo Simoes

CSM robot research projects include:

Smart Cones Road construction is going high-tech. The Colorado Department of Transportation has charged CSM students to build smart traffic cones. Powered by fuel cells and rechargeable batteries, these cones will function as autonomous robots, allowing construction workers to remotely position the orange cones used to re-route traffic.

Batmobile Engineering students converted a Lockheed Martin Mars Rover into a hazardous area exploration machine. The new Rover explores abandoned mines, able to enter environments that are unfit for humans. The Batmobile, appropriately named by students for its observation of endangered bat species within mines, is being developed to map and take readings of mine climate conditions. The research will contribute to the preservation of bat habitats.

Water on Mars In support of long-range missions to Mars and other planets, Research Professor Mike Duke of the Center for Commercial Applications of Combustion in Space, Engineering Professor Robert King, and Assistant Professor Colin Wolden of chemical engineering, are working together to develop computer models and laboratory-scale robots that can excavate regolith from the moon, Mars and Phobos (a Mars moon) to provide water and propellants for future missions to Mars.

Mysteries of the Giant Octopus Maritime lore is filled with the secrecy of the evasive and potentially dangerous octopus. CSM students, in cooperation with the University of Arizona and Alaska Pacific University, are tracking the giant octopus and solving the mystery. Students are building a submarine to traverse the cold waters of the octopi habitat to track these animals by tagging them with sonic tags. "We're building the tracking system that allows researchers to study their movements and behaviors," said Tyrone Vincent, assistant professor of engineering.

Mars and maritime uses

Assistant Professor Chris Debrunner

Safer Mining Mucking is a tedious and necessary job in a mining operation. Assistant Professors John Steele, Tyrone Vincent and Chris Debrunner of the Department of Engineering are simplifying the process through automation. The semiautonomous Load, Haul, Dump – or LHD – can move humans out of a mine and position them in front of a computer screen, where they can remotely operate the robot.

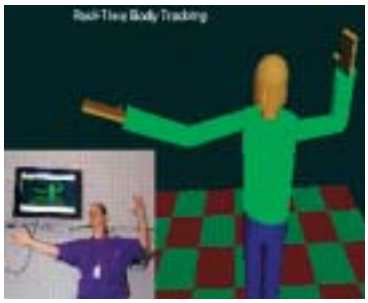
Stereo-vision is a primary research thrust that will allow the LHD to develop 3-D models of the mining environment. "Loading requires technique. The LHD must see the rock pile and develop a strategy to approach and remove the rock," said Steele. This technology also allows the LHD to excavate rock piles with minimal operator interaction, thereby placing humans in a supervisory role at a safe distance.

Smart Bits Mines utilize long wall shearers to break rock, such as coal and trona, at speeds of 100 to 110 feet per minute. Shearer operators position the machine to mine only the desired mineral, avoiding other formations. According to Steele, using stereo-vision systems and smart bits can allow humans to avoid this dusty environment. Smart bits, in conjunction with radio-wave sensors, will be attached to the ends of the shear to detect different formations of rock.

Building Ships Welding areas are another environment potentially dangerous to humans. Funded by the National Science Foundation, Vincent, Debrunner and Steele are developing a vision-based automated welding system that uses a robot. This system will have the potential to weld ships together with no humans present at the welding location.

"The challenge that we've addressed is developing a robotic welder that can weld in a non-flat position," said Vincent. "Navy ship-building would be a great application of this technology, because these welders will build and repair ships with less direct manpower."

Driver Not Required Neural networks make cars without drivers possible. Associate Professor Marcelo Simoes of the Department of Engineering is creating a system that is capable of learning and predicting the best driving route. "This technology also applies to smart cruise controls that automatically decide if one car is too close to another and then compensate," said Simoes. Intelligent transportation and highway systems will use neural networks to communicate with cars.



Robot Construction Imagine being able to move an enormous building crane with a wave of your arm. Engineering Professor William Hoff and engineering graduate student Jason Luck have made it happen. With 3-D imaging and artificial intelligence technology, they have simplified construction by allowing a single operator to control the crane from the ground with arm and hand gestures.

Alumni Notes quotes

Alexander '74 honored for leadership

Craig Alexander BSc Geol '74, director of information technology for Teller County, Colo., received the Teller County Leadership Award in December. Among his accomplishments are designing and implementing a complete local and wide-area network for the county's computers, an Internet-based email system for all communications in the county, a county-wide intranet system, a functioning imaging system for the clerk and recorder's office and a GIS system for the assessor's, building and transportation departments. He has worked for Teller County since 1989.

Connect with employers on-line!

The CSM Alumni Association has teamed up with MonsterTRAK, the on-line career resource. MonsterTRAK's database can be accessed only by alumni of partner schools. This security allows employers to target their recruitment efforts to CSM alumni, as well as other colleges and universities nationwide, assuring them a highly qualified pool of candidates. This no-charge service is available to alumni who are active members of the Association.

From the Mines' web page, click on "Alumni and Friends" or go directly to the alumni page at www.alumnifriends.mines.edu. Then click on "Alumni Association" (along the top). Under "Services, Programs, Member Benefits" find and click on "Career Services." Scroll down to Resume Posting and underneath it, MonsterTRAK. You will need a password from the Alumni Association (303-273-3295 or 800-446-9488, ext. 3295).

In addition to the resume database, CSMAA career services also lists available jobs in the engineering/sciences fields. "Jobs" is under "Services, Programs, Member Benefits." If you are an active member of the Association and are interested in any of the jobs listed, call the Association for contact information.

Pachucki '78 to chair BLM advisory group

Walter Pachucki BSc Min '78 has been named chairman of the Central California Resource Advisory Council to the Bureau of Land Management.

Pachucki is president of TEAM Engineering and Management Inc., an eastern Sierra-based business in Bishop, Calif. He is an original member of the advisory council, appointed by then-Secretary of the Interior Bruce Babbitt in 1995 to represent the public-at-large.

Pachucki's group is one of 24 advisory councils through the West that advise BLM management on the use of public lands. Notable accomplishments of the Central California RAC are the development of standards and guidelines for grazing on public lands, standards and guidelines for recreation on public lands, standards for recreation fees, guidelines for distribution of range improvement funds and successful opposition to a proposal to trade away valuable federal oil leases.

Announcing the 18th Annual Alumni Golf Tournament

June 3, 2002

West Woods Golf Course
6655 Quaker Street, Arvada, Colorado

6 a.m. Registration begins
7 a.m. Shotgun start

Price: $100 (includes lunch)

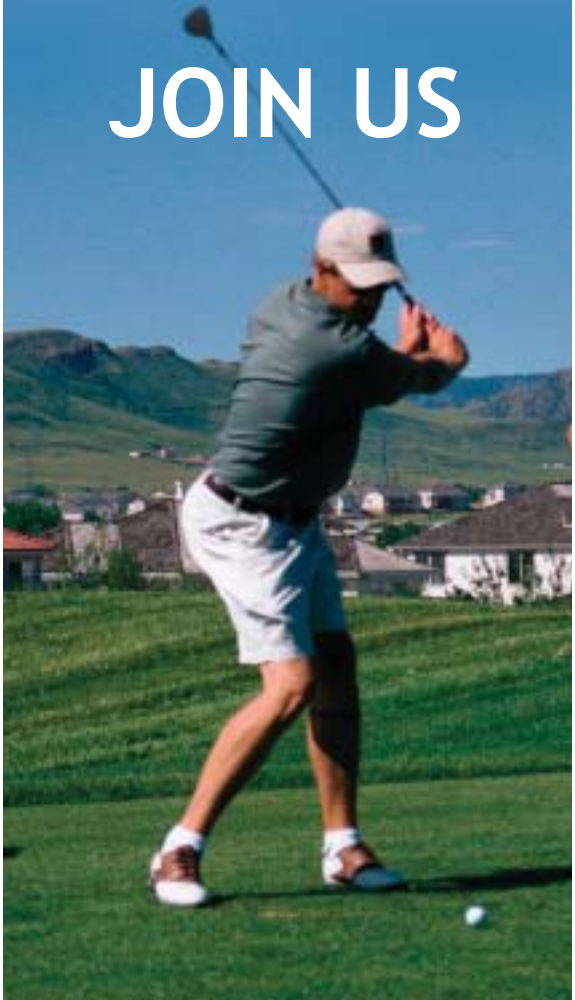
Proceeds benefit the CSMAA Emergency Student Loan Fund

Sponsorships available:
Sponsor: $100
Patron: $250
Corporate Donor: $500

Tournament chairs:
Joel '95 & Jennifer '90 Day

For information, to register, or to volunteer, call the CSMAA office at 303-273-3290

JOIN US



M-Blems: Explaining the logo

By Roland B. Fischer Met E '42

The recent creation of Mines Marbles™ set off discussions about radii, diameters, spherical triangles, and probably other terms.

The usual Mines logo is also known as a Reuleaux triangle if it is on a plane surface. This term does not apply if the logo is applied to a curved surface such as the side of a Mines cup or cap because it distorts the Reuleaux triangle. Of course we still know what the logo stands for.

The logo was used as early as 1894, although the design of the interior was different than the present version. **Horace H. Atkins Jr. EM 1894** designed the shape calling it a spherical triangle. That seems a reasonable call; however, it isn't accurate.

As James/James *Mathematics Dictionary* explains: *A Reuleaux triangle is a closed curve consisting of three arcs that join vertices of an equilateral triangle; each arc joins two vertices and lies on a circle through those vertices that has its center at the remaining vertex. This "triangle" is a curve of constant width in the sense that if r is the radius of the circle, then for any line L, the "triangle" lies between two lines parallel to L and separated by distance r.*

Reuleaux triangles have been used as basic logos for various companies including the Denver Equipment Company. Some Mines graduates have used them for the logos of their companies.

Now, consider the Mines Marble™. It can be considered a Reuleaux tetrahedron.

The granite monument on the Mines campus was created to celebrate the 100th anniversary of the Alumni Association. The base is flat and the upper part is a section of a Reuleaux tetrahedron. The logo on the monument is not a spherical triangle, nor a Reuleaux triangle, but a shape of a complex form.

Similarly, Mines Marbles™ do not have the logo in the form of spherical triangles.

To paraphrase the Reuleaux triangle description: A Reuleaux tetrahedron is a closed volume consisting of four areas that join vertices of a regular tetrahedron; each area joins three vertices and lies on a spherical surface through these vertices with its center at the remaining vertex. This "tetrahedron" is a volume of constant width in the sense that if r is the radius of the spherical surfaces, then for any plane P, the "tetrahedron" lies between two planes parallel to P and separated by distance r.

The figures are named after a German mathematician, Franz Reuleaux, 1829-1905.

The Mines Marble™, if made with precision, would have knife edges where the surfaces meet and the vertices would be pointed. This would cause the marbles to wear pockets and scratch surfaces. Therefore, the rounded edges and vertices are practical. The remarkable property of the Mines MarblesT™ to roll rather evenly between two parallel planes is unexpected and makes them an interesting curiosity although the rolling is not perfectly even because of the lack of sharp edges and pointed vertices.

In the book *Mathematical Models* by H. Martyn Cundy and A.P. Rollet, it is stated that the circle is not the only curve of constant width. There are an infinite number of curves called non-circular rollers. As an example, the authors show the roller triangle called, by others, the Reuleaux. Mention is also made of the discontinuous curve at the vertices —the sharp points mentioned earlier. Rollers can also be made from convex polygons with an odd number of vertices. The roller tetrahedron is also mentioned in the book as being difficult to make. So the makers of the Mines Marbles™ are to be congratulated!

All in all, another good M-blem!

Thanks to Bob Sorgenfrei in the Arthur Lakes Library, Janice Estey, Aspen librarian and Tom Kauper who helped with the research.

To order your own bag of five Mines Marbles™, call the Alumni Association at 303-273-3295 or 800-446-9488, ext. 3295. Cost is $10 plus shipping and handling.

Philanthropy at mines

Colorado School of Mines received more than $25,000 from each of the following donors between November 9, 2001 and February 22, 2002.

Individual Gift

Scot K. Anderson (BSc Phy '85) joined the Simon Guggenheim Society with an equipment donation to the School. The value of the McPherson Vacuum Ultraviolet Spectrometer System was assessed at $90,000. It is now being used in the Physics Department for both undergraduate and graduate research.

In honor of his class' 60th reunion, **Harry D. Campbell (P E '42)** contributed $125,000 to establish the Harry D. Campbell Endowment for Excellence in Football to promote the long-term quality and competitive strength of the intercollegiate football program at Mines. Fay Shwayder and Campbell also contributed $5,000 each to the Undefeated Championship Football Team of 1939 Scholarship Fund.

Fred Dueser (P E '49) generously supported the Annual Fund with a gift of $25,000, thereby renewing his membership in the Guggenheim Society of the President's Council. Dueser now stands as one of the largest supporters of the School's unrestricted funds.

The Petroleum Engineering Department was the recipient of **R. Charles Earlougher's (P E '36)** generous support of the department's discretionary fund through his gift of nearly $30,000. Earlougher, who was a charter member of the Guggenheim Society in 1997, renewed his membership with this gift.

The Mining Department was supported by **Charles R. Fitch (E M '49)** with a $50,000 gift to enhance faculty development. Fitch renewed his President's Council Guggenheim Society membership and will also be inducted into the Mines Century Society for his lifetime of support, which now exceeds $100,000.

Wilma Fogarty, widow of **Charles Fogarty (E M '42 '52)**, enhanced the scholarship fund established in his memory with a gift of $25,512. Combined with Mrs. Fogarty's past financial support, this makes the Fogarty Scholarship one of the largest endowed scholarship funds at Mines.

Mr. Ralph L. Hennebach (Met E '41) renewed his Simon Guggenheim Society membership with a contribution of $115,185 to The Hennebach Visiting Professorship.

Alfred T. Ireson (P E '48) contributed $65,000 plus a $5,500 matching gift to the Alfred T. Ireson and Family Endowed Scholarship Fund. He also gave $5,000 to the Mines Annual Fund.

Eugene C. McMahan (Geol E '49) established a charitable gift annuity with a gift of $200,000. The annuity residuum will be added to the McMahan Scholarship Fund.

Mr. F. Steven Mooney (Geol E '56) renewed his Simon Guggenheim Society membership with a contribution of $25,000 to the Mines Annual Fund.

William M. (Met E '40) and Kathryn Mueller finalized a life income gift that provides a $100,000 deferred interest to Mines. The gift will eventually establish an endowed scholarship fund in the Muellers' name.

William F. (Geol E '52) and Marilyn Oline contributed securities valued at $25,345 to the Class of '52 Endowed Scholarship Fund. They have been President's Council members since 1986 and this year Bill's gift is in honor of his 50th-year reunion.

Additional distributions of $796,854 were received from the estate of **Elizabeth Sopris**, bringing total distributions to $1,796,854 to date. Mrs. Sopris was the widow of **Robley Sopris (Geol E '26).**

Corporate and Foundation Gifts

The **Burlington Resources Foundation** contributed $25,000 to support the Department of Petroleum Engineering.

Gifts totaling $45,000 from **Chevron Products Company** were directed toward the following: Department of Geophysics, a fellowship in Geophysics, Department of Geology and Geological Engineering, and the Women in Science, Engineering and Mathematics (WISEM) program.

Adolph Coors Foundation contributed $289,000 toward the William K. Coors Distinguished Chair in Chemical Engineering and the Herman F. Coors Professorial Chair.

The **Viola Vestal Coulter Foundation** gave gifts totaling $108,000 to support the following: the Coulter Chair in Mineral Economics, the William Jesse Coulter Instructorship in Mineral Economics, the Viola Vestal Coulter Instructorship in Mineral Economics, the Mineral Economics Department for Professional Development Fund, the Mabel M. Coulter Student Health Center, Viola Vestal Coulter Foundation Graduate Fellowships, Viola Vestal Coulter Foundation Undergraduate Scholarships, and William J. Coulter Outstanding Undergraduate/Graduate Stipends.

The **Hach Scientific Foundation** has given a gift of $43,000 to the K-9 educational initiative, the Mobile Science Show.

With a gift of $25,000, the **ISS Foundation** contributed to the ISS Foundation Ferrous Metallurgy Grant Program Professor, Dr. John Speer.

The **Li Foundation** contributed $42,000 for Li Foundation Fellowships for students who have come to Mines from Central South University of Technology, Changsha, Hunan, China.

The **Ralph M. Parsons Foundation** supported the Engineering Practices Introductory Course Sequence (EPICS) Engineering Design Laboratory with a gift of $150,000.

The **Phelps Dodge Foundation** contributed $50,000 to the Phelps Dodge-Ansell Endowment for Excellence in Mining Engineering.

Questar Corporation contributed $33,737 to support undergraduate scholarships and building projects in the departments of Petroleum Engineering, Geophysics and Geology and Geological Engineering.

Deferred Gift from Dempseys to Support Scholarships, Library

When Stan and Judy Dempsey decided to endow a scholarship at Mines in 1997, they were demonstrating their support for an institution they had long admired. Last fall, they greatly extended that support by establishing a flexible gift annuity with a contribution of nearly $200,000 in appreciated securities. The annuity will begin making payments to them on a date they choose. Ultimately, its principal will be divided between the Dempseys' scholarship endowment and the Wood Mining History Archive at the Arthur Lakes Library.

Although Stan is not a graduate of Mines, he is well acquainted with the School's unique character. He has been active in the mining industry throughout his career, having been employed by AMAX, Inc. for 27 years. He is currently Chairman of the Board and CEO of Denver-based Royal Gold, Inc. and serves on the boards of several other companies. He is a lifetime member of the Board of Governors of the National Mining Hall of Fame and Museum.

Stan also knows Mines as a student; he spent his freshman year at the School in 1956-57. Although he did well, he decided to transfer to the University of Colorado, where he earned a B.A. in geology in 1960 and a law degree in 1964.

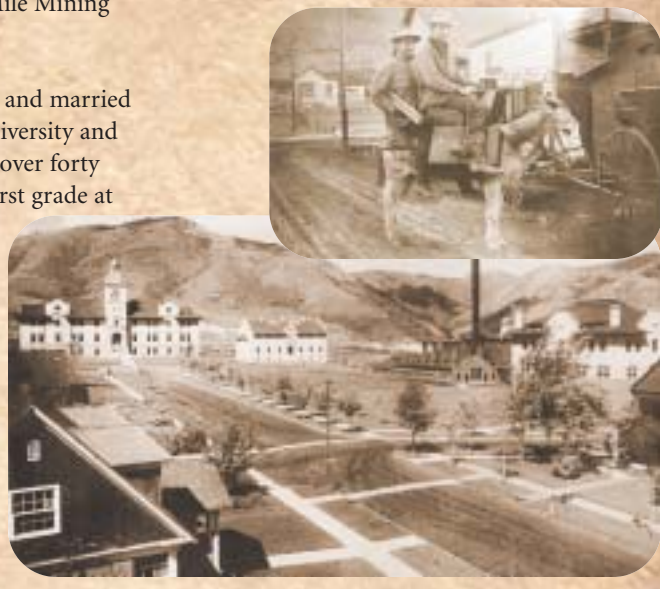
Stan is widely respected for helping to pioneer mining practices that balance the need for development with environmental protection. Because he's always enjoyed the outdoors as a hiker and a fisherman, environmental awareness comes to him naturally. He is also interested in history, and co-authored a book, *Mining the Summit,* on the Ten Mile Mining District north of Leadville.

Stan and Judy met in high school and married in 1960. Judy attended Butler University and has taught elementary school for over forty years. She is currently teaching first grade at Devinny Elementary School in Lakewood.

"We've always had the greatest respect for Mines, its mission, and the high-quality education that it provides," Stan notes. "We are delighted to be able to support it in such a concrete way."

Flexible Gift Annuity Facilitates Retirement Planning

Recently, Mines has received several gifts in the form of *flexible gift annuities.* This vehicle is a simple contract between the donor and Mines. In exchange for an irrevocable gift of cash or securities, Mines agrees to pay one or two annuitants a fixed sum each year for life, with payments starting at least one year after the donor's gift. The annuitants may elect to start receiving payments on any one of a range of dates. The older the annuitants at the time of gift and the longer they elect to defer payments, the greater the fixed income they receive. In most cases, part of each payment is tax-free, increasing its after-tax value. The flexible annuity is particularly valuable for donors who want to make a gift to offset income now, but wish to defer payments until they retire. For more information, contact Chris Wenger, Director of Planned Giving, at (303) 273-3140 or *cwenger@mines.edu.*



Anadarko Sponsors Scholarships, Student Organizations

During a recent campus visit, Anadarko Petroleum Corporation executives presented a gift of $45,000 to Colorado School of Mines. The visiting group included Michael O. Bridges, Chief Engineer; Francois Gauthier, Chief Geologist; and Mike Seeber, Chief Geophysicist. Mark Pease, CSM alumnus (PE '79) and Vice President for Engineering and Technology was unable to attend due to a scheduling conflict. The gift is directed toward three departments, with $25,000 allocated to Petroleum Engineering, and $20,000 shared between Geology and Geophysics.

From left, Michael Bridges, Anadarko chief engineer, Craig Van Kirk PhD Pet '72, head, Department of Petroleum Engineering, Mike Seeber, Anadarko chief geophysicist, Terence Young MSc Geop '77, PhD Geop '80, head, Department of Geophysics, Barbara Olds, associate vice president of Academic Affairs and Dean of Faculty, Francois Gauthier, Anadarko chief geologist and Murray Hitzman, head, Department of Geology.

Anadarko has established three competitive undergraduate scholarships of $5,000 in the Petroleum Engineering Department. The corporation has also directed $2,500 toward the Campus Society of Petroleum Engineers for educational use. The remaining $7,500 may be used at the Petroleum Engineering Department's discretion.

Shell funds have enabled the departments of Geophysics, and Geology and Geological Engineering to offer two $5000 scholarships to one graduate student and one undergraduate. Another $5000 is designated for a student colloquium or similar program in earth sciences. The student chapters of the American Association of Petroleum Geologists and the Student Society of Economic Geologists will also receive $5000 for educational use.

Anadarko, named as one of the fastest growing companies in 2001 by Fortune magazine, has US operations in the Mid-Continent and Rocky Mountain regions, as well as Texas, Louisiana, Alaska, and the Gulf of Mexico. Internationally, Anadarko is active in Africa, Australia, and the North Atlantic.

Bill Sullivan, Executive Vice President of Exploration and Production, expressed his enthusiasm for Anadarko's ongoing relationship with Mines: "We have enjoyed our long history with Mines, and we are proud to support the excellent work they are doing to attract and educate qualified students in these fields. We depend on talented new graduates to complete our growing workforce. We find that the students we receive from Mines are top graduates who are capable to work in the field immediately."

Shell Supports Departments, Minorities, Scholarships

Shell Oil Company Foundation recently donated $25,000 to the Geophysics Department, bringing their total 2001 contributions to Colorado School of Mines to $140,973. Shell has supported several departments and programs at CSM during the year, including Geology and Geological Engineering, Geophysics, Petroleum Engineering, Chemical Engineering, Mechanical Engineering, the Minority Engineering Program, and a variety of scholarships. Shell's total gifts to Mines since 1978 are now in excess of $2 million.

Shell Departmental Grants—totaling $60,000 for 2001—are designed to strengthen activities in specified academic areas. The funds are used for creative and exploratory projects in accordance with departmental priorities. For example, the Department of Geophysics is currently directing Shell funding toward establishing a specialized computer lab that will be available to the campus for teaching programming languages.

Shell is also a strong supporter of the CSM Minority Engineering Program (MEP). The corporation sponsors two MEP K-12 programs for talented minority students from across the country with strong ability in math and science. The summer residential programs—one for grades 8 and 9, the other for 11 and 12—provide intensive math and science instruction, involve students in hands-on projects, arrange industry tours, provide recreational opportunities, and give students insight into university life. Shell also sponsors the MEP Challenge Program, which helps prepare incoming freshmen for the academic rigors of their first year.

Another way Shell supports minorities in engineering is through the Shell Incentive Fund. Scholarships are awarded based upon merit and renewed each year contingent upon continued academic success. Shell awarded six such scholarships for the 2001-2002 academic year.

Shell's current funding strategy for higher education is unique in that the company has cultivated particularly strong relations with a few select institutions, including MIT, Stanford, and Colorado School of Mines. On a recent visit to campus, Dr. Yoram Shoham, Shell Oil Company's Vice President for External Affairs, pointed out that "CSM is uniquely qualified in critical disciplines for our industry."

As part of this ongoing relationship, a collaborative project coordinated by the Department of Geophysics was recently initiated. The research project will bring leading Shell scientists together with CSM faculty and students. Work will be conducted on the CSM campus and at Shell facilities in Houston. Going beyond the traditional research consortium model, this initiative brings the very best scientists at Shell together with leading academics and graduate students at Mines, providing for a powerful exchange of knowledge between agencies working at the forefront of their fields.

Alumni Events calendar

June

13 Lunch Bunch, an informal alumni get-together, meets at the Buffalo Rose in Golden, Colo., 11:30 a.m.

20 Grand Junction section luncheon at Bookcliff Country Club, 2730 G Road, noon. For information call John Howe at 970-242-4903 or Del Tolen at 970-256-1118.

Alumni Mixer Downtown Denver. 5-7:30 p.m. Wyncoop Brewing Company, 1634 18th Street. $5 per person includes two drink tickets & hors d'oeuvres. RSVP at 303-273-3295.

29 Houston section: Offshore Rig Tour, Galveston Ocean Star offshore rig tour, 11 a.m. Details TBA

July

11 Lunch Bunch, an informal alumni get-together, meets at the Buffalo Rose in Golden, Colo., 11:30 a.m.

18 Grand Junction section luncheon at Bookcliff Country Club, 2730 G Road, noon. For information call John Howe at 970-242-4903 or Del Tolen at 970-256-1118.

27 Fishing derby and family barbecue at the Cross-D-Bar Ranch in Westcliffe, Colo. $25 per person for the derby (win 50 lbs. of ranch-grown beef) at 10 a.m. and 2 p.m. $10 per adult for barbecue at 3:30 p.m. $6 for children 13 & under. Reservations required. Call 303-273-3295.

August

8 Lunch Bunch, an informal alumni get-together, meets at the Buffalo Rose in Golden, Colo., 11:30 a.m.

15 Grand Junction section luncheon at Bookcliff Country Club, 2730 G Road, noon. For information call John Howe at 970-242-4903 or Del Tolen at 970-256-1118.

September

10 Houston section: Colorado Rockies vs. Houston Astros ballgame, 7:05 p.m., Enron Field. Details TBA

12 Lunch Bunch, an informal alumni get-together, meets at the Buffalo Rose in Golden, Colo., 11:30 a.m.

19 Grand Junction section luncheon at Bookcliff Country Club, 2730 G Road, noon. For information call John Howe at 970-242-4903 or Del Tolen at 970-256-1118.

October

10 Lunch Bunch, an informal alumni get-together, meets at the Buffalo Rose in Golden, Colo., 11:30 a.m.

24 Grand Junction section luncheon at Bookcliff Country Club, 2730 G Road, noon. For information call John Howe at 970-242-4903 or Del Tolen at 970-256-1118.

Memories for Sale!!

The current staff of the *Prospector* is cleaning house and trying to raise money by selling overstocked yearbooks. The following years are for sale at $15 each (plus $2 shipping and handling per book):

'53, '54, '56, '57, '58, '59, '60, '61, '65, '67, '70, '72, '74, '75, '76, '77, '78, '80, '81, '83, '84, '85, '86, '87, '88, '89, '90, '92, '93, '94, '95, '97, '98, '99, '00, '01.

Name _____

Address _____

Year(s) _____

Total # of books _____

+ Shipping & handling ($2 ea.): _____

TOTAL enclosed: _____

(Make checks payable to *Prospector*)

Send to: Maureen Keller, Prospector yearbook, 1600 Arapahoe Street, Golden, CO 80402; 303-273-3294; mkeller@mines.edu

Staying connected

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International

Vancouver, Canada

Cordilleran Round-up
Eight alumni and friends got together for breakfast at the annual Cordilleran Round-up in Vancouver in January. In attendance were John Anderson, Dave Philip, **Arne Birkland BSc Geol '72, Barrett Sleeman EM '64, Al Homenuke BSc Geol '74, John Chapman BSc Min '71, Norm Ross EM '69, MSc Min '70** and John Fairley.

West

Alaska

Back row from left, **Alex Kayanan BSc '99, Zane Kuenzler BSc Pet '00, BSc Econ '01, Becky Brown BSc Math '92, Jess Kindler BSc Min '98.** Front row: **Mindy Arbuckle BSc Econ '01, Melanie Westergaard BSc Geop '87, Holly Daugherty BSc Eng '01, Paul Williams BSc Pet '89,** (and not pictured, **Eric Brudie BSc Geol '84**) met at Harry's Restaurant in Anchorage for hors d'oeuvres and good conversation before the Colorado College vs. University of Alaska hockey game. Most alumni rooted for the Colorado team, of course.

Rocky Mountain

Colorado Springs

Mines alumni and Colorado College alumni cheered on their men's basketball teams Jan. 29 after a reception for both groups. Mines won the reception (in terms of number of attendees) but Colorado College won the game.

Idaho

At last-minute get-together took place at the Dutch Goose on State Street in Boise, Idaho to celebrate the Mines ski team competing in town. Team members Terra Williamson, Sarah Thompson, Maxi von Eye, Christy Marsh, Andy Tripp, Ryan Cadenhead, Justin Anderson, Herold Reinertsen and Coach Doug Harme mingled with Jacquie and **Jim Classen Geol E '57, George Heiser Met E '64, Wayne D. Pickerill Met E '67, Scott Rosenberg BSc Met '79, Pete Johansen MSc Env Sci '96 and Bob Fischer Met E '56.**

Phoenix, SME Conference

The CSM Mining Engineering Department sponsored a reception at this year's Society of Mining Engineers conference in Phoenix. Many CSM alumni attended.

Metro Denver

Golden

The Golden Lunch Bunch meets the first Thursday of every month at the Buffalo Rose on Washington Street in Golden, Colo.

West, Central, Downtown

The metro-Denver section has begun holding monthly mixers at area bars. In January, a successful mixer was held at the Wyncoop Brewery downtown with more than 50 alumni from the class of 1950 to the class of 1999 in attendance. In February, two mixers were held, one at the Wyncoop, the other at Gordon Biersch Brewery at Flatirons Crossing. March's event added a third location, the Rock Bottom Brewery near the Denver Tech Center.

At the Black Bottom Brewery near the Denver Tech Center.

At the Wyncoop in downtown Denver.

Gulf Coast

Florida

The Trefny's joined Florida alumni at the annual Bone Valley barbecue in March. The Mines swimming team also was in attendance. The swim team participated in the national championship at Orlando, Fla., before the event, and were guests at the picnic. **Judge Holmes BSc Geol E '60.** The Bone Valley group hosts an annual picnic that is always well attended.

The Trefnys with the swim team.

In memoriam

FRANCIS "FRANK" X. CAPPA EM '33 died Feb. 13 in Vancouver, Wash. He was 90. Cappa was a mechanical engineer at Alcoa for 34 years before retiring. He was a member of Our Lourdes Catholic Church and a former member of the Groganeers Dance Club. He taught mineralogy, geology and metallurgy part time at Clark College from the 1950s through the 1970s. He enjoyed taking students on field trips to discover geologic treasures. His wife, Marjorie, predeceased him. Cappa's survivors include three daughters and two grandchildren.

DAVID W. CASSELBERRY BSC MIN '79 of Bartlesville, Okla., died Sept. 17 after a lengthy illness. He was 43. He joined Phillips Petroleum Company in 1979 as an engineer. In 1981 he married Caroline Koenig. In 1984 he earned a master's degree from Southern Methodist University. Casselberry successfully climbed the corporate ladder and was chief economist for Phillips. His volunteer activities included several years on the Girl Scouts board of directors and a finance and investment committee member for the Boy Scouts of America. He was a member of Tau Beta Pi and Grace Community Church. In addition to his widow, two sons, two daughters, his parents and numerous other relatives survive him.

RICHARD E. DAWES EM '58 of Canada died July 29 after a courageous battle with lung cancer. According to his widow, Lorraine, "Dick was a proud graduate of Mines." He was retired deputy administrator of the Office of Surface Mining. In addition to his widow, three daughters, a son, a stepson, a stepdaughter, four step-grandchildren, a sister, and a brother survive him.

GLENN "BILL" WILLIAM DEPUY GEOL E '52 of Denver died Jan. 3 at age 71. After graduation, he earned a master's degree from University of Colorado and served two years in the U.S. Army. He was a retired civil engineer for the U.S. Bureau of Reclamation, where he worked for 40 years. He was a fellow of the American Concrete Institute and founder and executive committee member of International Congress on Polymers in Concrete. His hobbies included tennis, running and bicycling. DePuy is survived by his widow, Erika, three sons, a sister and six grandchildren.

ROBERT H. DUNWOODY GEOL E '49 died Jan. 10 in Omaha, Neb. He was 79. During World War II, Dunwoody served in the U.S. Navy as a radar technician. After graduation, he was an exploration geophysicist for Amoco Oil for 31 years. He moved 45 times and lived in Louisiana, Texas, Oklahoma, Kansas, New Jersey, Illinois, Tripoli, Libya, Singapore, Indonesia and Taipei, Taiwan. He also worked in Africa, South America, and Southeast Asia. Dunwoody married Evelyn Brower in 1946. They had two children. He enjoyed golfing and fishing. He was an accomplished woodworker and craftsman and enjoyed HO gauge trains, remote control planes, miniature shipbuilding and miniature dollhouses. Dunwoody is survived by his widow, children and two sisters.

FRANK A. FOLEY EM '49 died Nov. 20 at age 80. Foley was president of his 1940 graduating class in high school. He enrolled at Mines, but put his education on hold in 1942 when he volunteered for the U.S. Army Air Corps. After three and half years of active duty he returned to Mines. While in the service, he met and married his wife Bea. After graduation, Foley worked in hydraulics and pneumatics as a sales engineer. He retired from Haskel Supply in 1989. He was a member of the American Legion and B.P.O. Elks. At CSM he was a member of Sigma Phi Epsilon. He also served in the Corps of Engineer Reserve, retiring as a lieutenant colonel.

HOWARD L. "LEE" GARRETT GEOL E '49, MSC GEOL '50, a retired field geologist in Houston, died Jan. 17 at age 77. He was born in California and married Helen Annabelle Crawford in Golden, Colo. He worked for the Shell Oil Company for 34 years, retiring in 1984. He explored for oil, gas, water, coal, geothermal energy and minerals in the Rocky Mountains, Montana, the Great Basin, the coast range of California, the Appalachians, Syria, Paraguay, Brazil and Belize. He is survived by a son, a daughter-in-law and three grandchildren.

GEORGE E. HESSELBACHER JR. MSC MIN '49 died of lymphoma Dec. 15 in Alexandria, Va., at age 82. He served in the Army for 25 years, retiring as a colonel in 1966. He then worked for Analytic Services Inc. for 17 years before retiring in 1984 as a principal civil engineer. In retirement, he was a volunteer tax counselor for the elderly in northern Virginia. Before attending Mines, he graduated from the U.S. Military Academy at West Point. He also earned a master's in business administration from George Washington University. During World War

II he served in the Mediterranean. Later assignments included West Germany, Greenland and South Korea. His military decorations included the Legion of Merit and two Army commendation medals. Hesselbacher was a member of the Army Navy Country Club, the Mineralogical Society of America, the Northern Virginia Mineral Club and the Fluorescent Mineral Society. His wife of 50 years and a daughter predeceased him. Survivors include two sons, a brother and four grandsons.

STUART J. HUSSEY MET E '40 died in Phoenix, Ariz., Nov. 27 at age 81. During World War II he served with the U.S. Army Engineers. Afterward, he was a mining engineer for the U.S. Bureau of Mines, mostly in Utah.

He moved to Arizona four years ago and was a member of First Baptist Church in Prescott. He enjoyed bowling, traveling, photography and fine dining. He attended his 60th class reunion in 2000. Hussey is survived by his widow, Nellamae, a son, a daughter, six grandchildren and a brother.

JOHN FRANKLIN MACALLISTER GEOL E '43 died Feb. 13 in Santa Fe, N.M., after a short illness. He was 82. After graduation, MacAllister served in the U.S. Army Corps of Engineers in England. He landed on Omaha Beach at H-hour on D-day. He received the Silver Star and Bronze Oak Leaf Cluster for gallantry in action and two purple-heart decorations for combat wounds. In 1946 he joined the Bureau of Public Roads as a civil engineer. He later served as New Mexico administrator for the Federal Highway Administration. MacAllister was an avid model railroader. He was proud of his Scottish heritage and 18 years ago established the New Mexico chapter of Clan Donald and Affiliated Scots, U.S.A. He is survived by his wife of 59 years, Myrtle, three children, seven grandchildren and two great-grandchildren

CHARLES D. REESE EM '43 died at home in Colorado Springs, Colo., Nov. 19 at age 84. Born in Montana and raised in Missouri, he established Colorado residency in 1939 after employment with a gold mining company and matriculated at Mines that year.

Following graduation, he served in the U.S. Army 332nd Engineering Corps General Service Regiment in England and Germany and was discharged as a captain. He married Jean Burt in 1946 and they raised three sons. He worked 35 years for Goodman Manufacturing Co. as district manager of underground mining equipment sales. He retired in 1981. While at Mines, Reese was a member of Tau Beta Pi, Sigma Gamma Epsilon, Scabbard and Blade, Blue Key and the Press Club. He served on the student council and was awarded the Brunton Compass as the outstanding student in mining engineering. With his wife, Reese enjoyed traveling, golf and bridge. He was a founding member of the Argonauts, a hospital volunteer and charter member of the Sunrise Methodist Church. His widow, sons and four grandchildren survive him.

THEODORE H. "TED" TEPPER PET E '49 died Nov. 18.

Upon graduation, Tepper, a Denver native, accepted a job with the Texas Company at its Port Arthur, Texas, refinery. During his 38-year career with Texaco, he served in a variety of positions including assistant refinery manager in Lawrenceville, Ill. He also worked in the alternate energy department in Denver, then moved to Los Angeles as plant manager. In Houston he was promoted to vice president and oversaw the departments of planning and logistics and trading and transportation. In addition, he served on the board of directors of the Colonial Pipeline Company. Tepper is survived by his widow, Suzanne, of Highlands Ranch, Colo., a sister, two children and two grandchildren.

CHARLES E. TRUESDELL EM '49 died Nov. 19 in Santa Cruz, Calif. He was 82. Truesdell spent his youth in China when his father was commander of a gunboat on the Yangtze River Patrol. Truesdell served in North Africa, Italy and France during World War II. He lived in Long Beach, Calif. for more than 25 years and worked for the Army Corps of Engineers in coastal protection. He and his young family lived in Venezuela, Mexico and Chile during his career as a mining engineer. He loved to sail and enjoyed the ocean and driving his sleek black sports car. Truesdell is survived by his dog Scamper, three daughters, 10 grandchildren and two great-grandchildren. A son and his wife of 51 years predeceased him.

CHARLES J. VINCENT MET E '40 died Dec. 6 at age 84 in Wierton, W.Va. After graduation, Vincent joined Weirton Steel Corp and during World War II, served in the U.S. Navy. He was with Wierton his entire career, retiring in 1983 as senior vice president in charge of day-to-day operations. Vincent served as president of the Fort Steuben Area council of the Boy Scouts, was Weirton United Way campaign chairman in 1981 and received the

In memoriam

"Weirton Spirit" award from his company. In addition, he was a member of many organizations including the Wheeling Royal Order of Jesters. He is survived by his widow, Audrey, a daughter, a granddaughter, and numerous stepchildren, step-grandchildren, and step-great grandchildren.

FREDERICK L. WUETIG MET E '49 died Feb. 13 in Dallas, after a lengthy illness. He was 81. He entered Mines in 1938, but interrupted his studies to serve in the U.S. Air Force. He flew 59 missions in North Africa and Italy. After finishing his studies at Mines, he worked for Reynolds Metals Company for 36 years in Arizona, Texas and Arkansas. He was a member of the American Society of Metals, the American Foundry Society, the American Metallurgical and Mining Engineers, and White's Chapel Methodist Church. He served as chair of the Garland County United Way and was an active Rotarian. Wuetig's special interests included traveling (which he did extensively), woodworking, gardening and golf. He will be remembered for his jovial spirit and kind heart. Wuetig was preceded in death by his first wife, Catherine Czarnowsky. He is survived by his widow, Joyce Dilbeck Wuetig, a daughter, a son, a stepdaughter, a

Also in Memoriam

RICHARD A. ANDERSON PRE '69
Sept. 9, 2001

PATRICK F. BREEN BSc Geol '84
2001

William J. Chapla EM '42
Dec. 9, 2001

Gregory A. Cone BSc Geop '70
May 2001

Albert J. Cornish EM '39
Dec. 4, 2001

George B. Morgan Jr.Geol E '51
November 2001

Joel M. Moss EM '42
April 2, 2001

Duane F. Nelson MSc Math '74
Sept. 17, 2001

David W. Resse Met E '48
April 4, 2000

Robert R. Reynolds PE '52, MSc PE '59
Nov. 1, 2001

James D. Shambach Met E '59
January 1, 2001

John J. Wallace Geop E '51
June 14, 2001

Eugene B. Williams PE '40
July 3, 2001

James N. Wilson Geol E '42
May 27, 2001

Howard E. Young Met E '49
November 2001

on the move

1940

Walter E. Heinrichs Jr. Geol E is chief executive officer for Heinrichs GEOExploration Co. & Associates in Tucson, Ariz.

1951

Roger A. Richter EM is CEO of Funding Associates Inc., in Denver.

1952

The Class of '52 has established a memorial endowment in honor of longtime coach and Mines athletic director, **Fritz Brennecke Hon Mem '69, Mines Medal '91**. The endowment will fund athletic scholarships for qualified Mines student recommended by the director of athletics according to guidelines and policies of the NCAA and CSM's financial aid office.

The endowment was established as part of the Class of '52's 50th reunion activities next May. Contributions are welcome immediately from former members of Fritz's many athletic teams, dedicated alumni and friends who

benefited from Brennecke's friendship, support and guidance. Fritz was highly committed to the academic and athletic environment at Mines. Through his hard work and dedication he elevated the role of the athletics program in helping to develop well-rounded professionals. It is the goal of the fund that it becomes a fitting tribute to a great gentleman who personified the Mines spirit. The fund may receive additional contributions at any time and from any interested donor.

Checks should be made payable to CSM Foundation—Fritz Brennecke Memorial and mailed to The CSM Foundation, P.O. Box 4005, Golden, CO 80401-0005.

In addition, **Carl Bieniewski EM '52** has suggested the class also sponsor a fund to have a life-sized bust of Fritz prepared to be placed at the entrance to Volk Gymnasium. The estimated cost is about $10,000 and contributions are welcome ($100 from 100 friends). Checks should be made payable to CSM Athletics—Brennecke Bust and mailed to **Marv Kay EM '63,** Athletic Director, CSM Athletic Department, 1500 Illinois St., Golden, Colo. 80401. As soon as sufficient interest is indicated (through donations), Kay will ask the CSM Board of Trustees for permission to place the bust on School property. The Class of '52 wishes to thank all former team members, friends and associates of Fritz' for helping to make 2002 the year to remember Fritz Brennecke. Your contribution is greatly appreciated.

1953

Michael D. Russell E M is deputy chairman of J.A. Russell & Co., in Kuala Lumpur, Malaysia.

1956

James W. Hobbs PRE, MSc PRE '64 is senior engineer at Service and Technology Corp.

John J. Zeman PRE is a financial planner for AXA Advisors LLC in Clayton, Mo.

1957

Cecil I. Craft Geop E co-owns Central Exploration Co./Data Computing Co.

1959

Gerald S. Keen Geol E is president of Bay Gas Storage Co., in Mobile, Ala.

1961

George R. Downs Jr. Geol E is a program manager for Geotech Environmental Equipment Inc., in Denver.

John B. Robertson Geol E is president and owner of JB Robertson Consulting in Desert Hills, Ariz.

1962

William R. Pitman PE, MSc Pet '66 is owner of Pitchfork Ranch Pitman in Athol, Idaho.

1963

David G. Atteridge Met E is laboratory science center director at Colombia Basin College.

1964

S. D. Chesebro' EM is chairman of Benton Oil and Gas Co., in Houston.

John D. Ellis Jr. Met E is general manager of MP Steel Corp.

1966

Charles R. Arnett Met E is employed by Silver Lake Analytical Services.

Daniel S. Witkowsky Met E is course coordinator for the Colorado Mining Association Education Foundation Inc., in Denver.

1967

Henry B. Crichlow PE is president and CEO of Unigas Corp., in Norman, Okla.

Loren L. Pritzel PRE is senior process engineer for Interline Resources Company.

Glenn C. Schilling, Jr. PRE is project development manager at Encompass Power Services.

1969

Sohrab R. Batmanglidj Geop E is president of Douzalkav Co., in Tehran, Iran.

James A. Krebs Jr. Met E, MSc Met '72 is chief executive officer for Midwest United Energy in Westminster, Colo.

John T. McDonough Jr. Geol E is environment vice president for Barrick Gold Corp. and has relocated from Toronto to Salt Lake City.

J. Douglas Pitts Chem E is managing director of Pitts and Associates LLC in Sedona, Ariz.

1970

Robert C. Scharp EM is an independent consultant and corporate director for Kinrade Resources in Monument, Colo.

Stephen D. Schwochow BSc Geol, MSc Geol '72 is an independent consulting geologist in Golden, Colo.

1971

Mahir M. Jalili MSc CPR is an attorney in Oak Brook, Ill.

Leonard D. Jones BSc Met is informational systems engineer for Qwest.

Wesley P. Nason BSc Min is a manager for VECO Alaska, Inc.

Charles E. Porter BSc CPR owns C. E. Porter & Associates in Pierceton, Ind.

Randolph P. Schneider BSc Met is an independent metallurgical engineer in Wellington, Colo.

Paul T. Treece BSc CPR, MSc CPR '78 is chief technology officer for Blue Falcon Networks Inc., in Los Angles.

Paul B. Trost PhD Geochem is president of MTA Remedial Resources Inc. (MTARRI), in Golden, Colo.

1972

Claude C. Corkadel III BSc Met is president and CEO of WellDog Inc., in Laramie, Wyo.

Michael G. Long BSc Pet is executive vice president for Nations Energy Ltd., in Houston.

John M. Neubauer BSc Pet is managing director for Pogo Hungary Ltd., in Budapest.

Nadim A. Sareyed-Dim MSc Met is president of UTIL S.A. in Belo Horizonte, Brazil. From 1974-2000, he was president of RIO Doce America in New York; chairman of California Steel Industries in California; and president of RDP terminals in Los Angeles. He also was president of DOCENAVE, a large bulk carrier company, and commercial director of CSN, Brazil's largest steel producer.

1974

Bentley F. Badgett II BSc Min is president of B&R Coal Company in Madisonville, Ky.

Marc D. Ernest BSc Pet is production manager for El Paso Production in Houston.

Benjamin W. Guenther BSc Min is head of mining for Anglogold (Jerritt Canyon) Corp., in South Africa.

Benton T. Kelly BSc Min is dragline engineer for Peabody Western Coal Company at the Kayenta (Ariz.) mine. He is in charge of dragline production efficiency improvement and production planning and watches over four draglines at Kayenta Mine and two at Black Mesa mine.

Frederick W. Obernolte Jr. BSc Geol is president of O&G Environmental Consulting LLC.

Robert G. Parkinson BSc Met is a staff engineer for Honeywell FM&T in Kansas City, Mo.

Kenneth R. Parrott BSc Math, MSc Geop '81 is a geophysicist for Interactive Earth Sciences Inc., in Denver.

1975

Cathy D. Cutrell BSc Geol is a knowledge engineer for BEA Systems, Inc.

John T. Jonas MSc Geop is director of technology at Trinity School of Midland, Texas.

Steven A. Lambert BSc Pet is special projects engineer for Unocal Corp.

Rodney W. Roberts BSc Pet is deepwater projects manager for Halliburton Energy Services in Houston.

1976

William K. Gibbs Jr. BSc Geol, MSc Geol '81 is senior geoscientist for ChevronTexaco in New Orleans.

Lee Ann Henderson BSc BE is a programmer for Computer Business Applications Inc., in Elizabethtown, Ky.

1977

Daniel L. Kunkle BSc Geop is co-director at Count Geophysics in London.

Jeffrey A. Russell BSc CPR is in field sales for the RTP Company in Conroe, Texas.

William H. Strickland BSc Min, MSc Met '90 is an associate for Interrail Services Inc.

1978

Earuch F. Broacha BSc CPR is senior staff reservoir engineer for Burlington Resources in Farmington, N.M.

Bruce M. Clemens BSc Phy is professor and department chair in the Department of Materials Science and Engineering at Stanford University. He is also a professor (by courtesy) in applied physics and is on the Stanford Synchrotron Radiation Laboratory faculty.

Andrew P. Swiger BSc Pet is vice president—Africa for ExxonMobil International LTD in London.

Bruce D. Wilkinson BSc Met, MSc Met '82 is a technical staff member at Los Alamos National Laboratories.

1979

Alan D. Buel BSc Min is a project manager for Envirocom.

Joseph L. Cornellisson BSc Geol, MSc Min Ec '84 is a systems analyst for Minerals Management Service.

R. Michael Glen BSc Min sells computer systems for Sun Microsystems, Inc.

Ray E. Jones BSc Pet is president of REJ Petroleum Engineering LLC in Golden, Colo.

James C. Mullarkey BSc Geol, MSc Geol '91 is a principal for LJ Oil Inc., in Littleton, Colo.

Kenneth R. Story MSc Geop is a

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co-founder and vice president of Vision Resources LLC in Houston.

Shelby S. Switzer III BSc Pet is a drilling superintendent for Unocal Corp., in Sugar Land, Texas.

Darrell E. Wagner BSc Met is superintendente procesos for Minera Barrick Misquichilca S.A. in Lima, Peru.

1980

David W. Baker PhD Min Ec is senior vice president of DIRECTV International Inc., in El Segundo, Calif.

Collin R. Fay BSc Min is president of Alpine Construction and Engineering Inc., in Grand Junction, Colo.

Julie F. Gibbs BSc Geol is earth science supervisor for ChevronTexaco in New Orleans.

Marcelo F. O'Keeffe BSc Min is director of Golden Engenharia.

1981

Abdulkader M. Afifi MSc Geol is chief explorer for Saudi Arabia.

Alberto P. Giussani MSc CPR is senior engineering adviser for Occidental Permian LTD.

Jon P. Hedlund BSc Min owns Photoworks of Taos, N.M.

Jorge C. Lira BSc Met, MSc Met '83 is president of Energotec S.A.C.

Wendy L. Myers BSc Geol is a physics/chemistry teacher at Albuquerque (N.M.) High School.

Stephen A. Sonnenberg PhD Geol received the Texas A&M University Geology and Earth Resources Council Distinguished Achievement Medal Dec. 15. He is area manager for PanCanadian Energy Resources Inc., in Denver.

Robert S. Vincent BSc Pet has relocated to Houston where he is in operational excellence for ChevronTexaco.

Kevin P. Woehr BSc CPR is product manager for marketing and development for B. Braun Melsungen AG in Melsungen, Germany.

1982

James F. Brayton BSc Pet is an operations engineer for Saga Petroleum in Midland, Texas.

Winthrop D. Childers BSc Phy is senior manager of technological services at Hewlett Packard Co.

Anne M. Cornellisson BSc Min is senior database analyst for Harding ESE.

Brian R. Disney BSc Pet is senior petroleum engineer for AEC Oil & Gas (USA) Inc., in Denver.

Pamela Woods Edrich BSc CPR is manager of Kaisen-Hill.

Richard A. Edrich BSc CPR, MSc CPR '86 is senior engineer at Gambro BCT.

Eric J. Lauber BSc CPR is an operations superintendent for Valero Refining in Krotz Springs, La.

Timothy J. Lee BSc Chem is a research scientist for NASA.

Stefan G. Magnusson BSc Geop, MSc Geop '85 is a market risk manager for ABN Amro Securities LLC in New York City.

George W. Moseley BSc Min, MSc Min Ec '92 is a broker associate for Russ Wehner Realty Company in Denver.

1983

Richard L. Ames BSc CPR, MSc CPR '01 is a CSM graduate student.

Friedrich R. Bassier MSc Min Ec is managing director of DMT-Deutsche Montan Technologie in Essen, Germany.

Michael B. Curto BSc Met is senior project engineer for Rayonier Performance Fibers in Brunswick,

Richard C. Jenner III BSc Pet is principal of Endeavor Natural Gas LLC in Houston.

Thomas R. Nickoloff BSc Geop is president and chief geophysicist for TRNCO Petroleum Corp., in Midland, Texas.

Michael R. Starzer BSc Pet is president of Bonanza Creek Oil Company in Bakersfield, Calif.

Diana L. Visser BSc Pet is an independent environmental consultant in Nokomis, Fla.

1984

Bobby D. Brady, Jr. BSc Pet is operations manager for Prima Energy Corp., in Denver.

John N. Cookson BSc Pet, MSc Pet '86 is a development adviser for Phillips Alaska Inc., in Anchorage, Alaska.

James E. Frey BSc Geol is vice president of strategic marketing for Micromuse, Inc.

Kevin L. Goosman BSc Geop is an information technology manager for ECOTEC Research & Consulting Limited in Birmingham, England.

Gary D. Harris BSc Geop is staff geophysicist for BP Exploration & Production in Houston.

Michael J. Kendrick BSc Min was promoted to general manager of operations at El Abra for Phelps Dodge. Currently he is concentrator manager at the company's Candelaria operation in northern Chile.

Thomas R. Strong BSc CPR is senior pastor for Pueblo Evangelical Free Church in Pueblo West, Colo.

Robert S. Tracy BSc Min is a manager at Sun Microsystems.

1985

Michael J. Freehling BSc Geol, MSc Env Sc '93 is a senior engineer with Brown and Caldwell in Nashville, Tenn.

Daniel S. Gralla BSc Pet is a consultant for Soekor E&P in Parow, South Africa.

Pedro P. Vera BSc Min is a sales engineer for C&H Systems Inc., in Englewood, Colo.

1986

E. MacLain Burriss BSc Min is an environmental safety and health manager for Carmeuse Lime Inc., in Annville, Pa.

Joseph P. Mahoney BSc CPR is managing director for Dale Carniegie & Associates in Denver

John T. Pinckney BSc Phy received his master's degree at the

Weizmann Institute. He is a technical support manager for Network Analysis Inc., a small thermal analysis software company in Tempe, Ariz. He and his wife have three children.

John W. Stinson BSc Eng is self-employed in Lyon, France.

Ruth C. Stinson MSc Min is a sales manager for Ingersoll Rand in Lyon, France.

1987

Carlos A. Ballon BSc Min is director of Thiess South America in Lima, Peru.

Linda A. Battalora BSc Pet, MSc Pet '88 is an attorney for Dahl & Osterloth LLP in Denver.

Renata J. Bollich BSc CPR is a process engineer for Immunex in Bothell, Wash.

Rumlan Dwiyatno BSc Geop is chief geophysicist for Devon Energy Java in Jakarta, Indonesia.

Jenni A. Etgen BSc Math is a senior staff specialist at WorldCom in Houston. She and **John T. Etgen BSc Geop '85,** who works for BP, have three daughters.

Mike A. Maurer BSc CPR is a process automation engineer for Dow Chemical Company in South Charleston, W.Va.

Daniel C. Ng BSc Pet is a products coordinator for ExxonMobil Asia Pacific in Singapore.

Gary S. Nordlander BSc Pet married Megan Friess in June. The couple resides in Englewood, Colo.

Paul E. Seyler BSc CPR is director of carbon fibers product development for Conoco Inc., in Ponca City, Okla.

Andrew D. Smith BSc Eng has been promoted to special-projects

project manager for The Larkin Group in Kansas City, Mo. His focus is watershed management and stormwater design projects.

Scott R. Thomas BSc Eng is a mechanical engineer for the National Parks Service in Lakewood, Colo.

David H. Thornton BSc CPR is a senior engineer for Marathon Ashland Petroleum in Garyville, La.

1988

Paul A. "Ty" Ferre BSc Geop is

now assistant professor in the hydrology and water resources department at University of Arizona.

Dean J. Gipson BSc Eng is senior civil engineer for the San Diego Metropolitan Wastewater Department.

Keerthi R. McIntosh BSc Geop is a staff geophysicist for Shell Exploration and Production Company in New Orleans.

Andrew J. Pott BSc Eng is PET staff bridge for the Colorado Department of Transportation.

Bambang Trigunarsyah BSc Eng is a lecturer in the civil engineering department at University of Indonesia in Depok.

1989

Bradley G. Baker BSc Pet is North East Asia chief representative for Baker Hughes Inc., in Beijing.

Dale L. Bender BSc Met is director of product management for SAVVIS Communications in Mountain View, Calif.

1990

Reed R. Figley BSc Eng, BSc Eng is a structural/mechanical engineer who, in January, began working on the Hanford Waste Treatment Plant Project (www.waste2glass.com), a 10-year Bechtel/Washington Group International venture to protect the Columbia River from legacy waste from the cold war. He works in Richland, Wash.

David A. Hart BSc Pet is staff engineer for NANA-Colt Engineering.

1991

Shawn L. Bennett BSc CPR is seal-less product manager at Sundyne Corp.

Joseph H. Katz PhD Math works in process improvement for Lucent Technologies in Westminster, Colo.

James Ruble, P.E. BSc CPR was promoted to technical services manager at the Valero Krotz Springs Refinery.

John H. (Trey) White III BSc Min is a senior mine engineer for the Newmont Carlin Operations in Carlin, Nev.

1992

Tariq A. Al-Omari BSc CPR is a process engineer for TECHNIP-COFLEXIP in Houston.

Jane E. Estes-Jackson MSc Geol is a geologist for McElvain Oil & Gas Properties in Denver.

Victoria B. Jackson Nielsen BSc Pet is project engineering manager for Well Dynamics Inc., in Spring, Texas.

Anna M. Young BSc Pet is a senior reservoir engineer for Shell Oil Company in Denver.

1993

Dean R. K. Bell BSc Pet is an oilfield services manager for Schlumberger Ltd., in Balikpapan, Indonesia.

Beth E. Kellett BSc Met is an engineer for Cobe Laboratories Inc., in Arvada, Colo.

Libanda Malapalale PhD Min Ec is a senior accountant for Charter Communications in Denver.

Michael D. Robb BSc CPR is maintenance manager of The Clorox Company, Kingsford Division.

Joseph M. Welch BSc Met, MSc Min Ec '01 is a broker associate for Cherry Creek Realtors.

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1994

Hanjun Cho BSc Eng is senior manufacturing engineer for Paramit Corp.

Nathan L. Eden BSc Min is a surveyor for Terry Surveying in Trinidad, Colo.

Serena A. Garcia BSc Pet is a petrophysical engineer for Shell Explorations Production.

Eliphas A. Hawala BSc Min is a mining superintendent at Elizabeth Bay Mine for Namdeb in Luderitz, Namibia.

Brenda K. Jacobs BSc Eng, MSc Engr Sys '97 is senior member of the technical staff at TRW Space & Electronics Overseas, Inc.

Andrew M. Ross BSc Geol is a water-quality specialist for the Colorado Department of Public Health and Environment.

John A. Zwingman Jr. BSc Eng is a professional engineer and project manager for Gilmore & Associates Inc., in Columbus, Neb.

1995

Darek T. Bruzgo BSc Eng is manufacturing vice president for D&R CNC Machining Inc., in Englewood, Colo.

Gunarti Coghlan MSc Env Sc is engineering project manager for IT Corp.

Rhonda Redin Gathers BSc Pet is a reservoir engineer with Questa Engineering Corp., in Golden, Colo.

M. MacLean Price BSc Pet is a product application engineer for Hughes Christiansen in The Woodlands, Texas.

Austina C. Matthias BSc Eng is senior analyst at El Paso Corp.

Richard J. Murtland BSc Eng is a design engineer for The Boeing Company in Mesa, Ariz.

1996

Christie J. Briscoe BSc Econ is director of risk management for AGL Resources in Atlanta.

Raul Cabrera-Garzon MSc Geop, PhD Geop '01 is a researcher for Instituto Mexicano del Petroleo in Mexico

W. Grover Coors BSc Phy, PhD Mat Sc '01 is chief science officer at Protonetics International Inc.

Eric C. Eccleston MSc Met is senior process engineer for Technip USA Corp., in San Dimas, Calif.

Shanna C. French BSc Eng is a product engineer for Centurian Wireless Technologies in Westminster, Colo.

Scott A. Goodwin Jr. BSc Pet is production supervisor at Marathon Oil Company.

Chris A. Ingalls BSc CPR is account manager for Aon Innovative Solutions in Arvada, Colo.

Kendra L. Lema BSc Eng is a senior analyst for Conoco Gas & Power in Houston.

Byron P. Poos BSc Econ is a technical consultant for Palazzo Inc., in Denver.

Robert D. Scott BSc Phy , BSc Math is a lieutenant in the U.S. Navy at Portsmouth Naval Shipyard in Gloucester, Mass.

Scott G. Van Sickle BSc Math is a software engineer for Abacus Direct in Broomfield, Colo.

Eduardo Vargas BSc CPR is a reservoir engineer for Shell International Exploration and Production in Houston.

Gary C. Yerby MSc Met is operations manager for Caterpillar Inc., in Tianjin, China.

1997

Mohammad Waqar Ali Asad is an assistant professor of mining engineering at NWFP University of Engineering & Technology in Peshawar, Pakistan.

Kriss B. Bergethon BSc Min is a project engineer for the W.L. Hailey Valley Creek Tunnel in Birmingham, Ala.

David A. Coghlan BSc Econ is senior analyst for Pace Global Energy Services.

Benjamin S. Hoffner BSc Chem, MSc Engr Sys '01 is an application engineer for Woodward Governor Company.

Tiffany A. Horn BSc Geop is a quality assurance geophysicist at Chroma Energy.

Brett D. Jackson BSc Eng is a design engineer for Rocky Mountain Consultants.

Jon M. Kilikewich BSc CPR is a chemical engineer for the U.S. Navy at the Naval Surface Warfare Center in Indian Head, Md.

Tae-Won Kim MSc Min Ec is commercial manager for SK Corp., in Seoul, Korea.

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W. Christopher McAnarney BSc CPR is a plant engineer for Sid Richardson Carbon Company in Big Spring, Texas.

Todd M. Mundorff BSc CPR is a process engineer for BP in Carson City, Calif.

Karen E. Rand BSc Eng is a design engineer for Barghausen Consulting Engineers Inc., in Kent, Wash.

Christopher M. Stevenson BSc CPR is corporate engineering coordinator for Forest Oil Corp.

1998

Gloria E. Aranda BSc Eng, BSc Eng is an engineer with Honeywell International Inc.

Mario Ballout De Giulio MSc Min Ec is a structuring manager for Enron in Caracas, Venezuela.

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Nadine Filosi Dame Msc Math is an instructor at Johnson & Wales University in Denver.

Chad R. Foster BSc Eng is an engineer for Cummins Inc., in Columbus, Ohio.

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U.S. Forest Service in Gunnison, Colo.

Jennifer R. Huber BSc CPR is a construction and maintenance engineer for Colorado Springs (Colo.) Utilities.

Eric K. Jacobs MSc Geochem is a project consultant for CH2M Hill Inc., in Scottsdale, Ariz.

Janna M. Kieffer BSc Eng is a water resources engineer for Barr Engineering in Minneapolis, Minn.

Cristy Emmons Meacham BSc CPR and her husband, James, announce the birth of their first child. Stefanie Lee was born Feb. 28 in Framingham, Mass.

Quentin R. Moore BSc CPR, MSc Env Sc '01 is a project engineer for TRC Environmental in Littleton, Colo.

Alex Raizman BSc CPR is a well engineer for Schlumberger IPM in Reynosa, Mexico.

Cody Teff BSc Pet is a reservoir engineer and Nina R. (Collongues) Teff BSc Pet is senior production engineer for Shell Exploration and Production Company in New Orleans.

1999

Nicole J. Abbott BSc CPR is an account manager for North American Dental Health Care CBD for The P&G Distributing Company in Longmont, Colo.

Mohammad A. Al-Bahar BSc Pet is a reservoir engineer for Kuwait Oil Company in Ahmadi, Kuwait.

Eric N. Avila BSc Eng is a drafting engineer for WestPlains Energy.

Brian F. Birnbaum BSc CPR is an engineer for Pioneer Astronautics in Lakewood, Colo.

Sam Brubaker BSc Eng and **Romana Rodriguez BSc CPR** were married June 2 in Northglenn, Colo.

The couple lives outside Salt Lake City where Sam is maintenance supervisor with Holcim Cement and Romana works for Questar Regulated Services. Pictured above are back row, from left, **Robin Taylor BSc Phy, Lisa Brown Wurster BSc Geol, MSc Env Sci '00, Heidi Erker BSc Pet '00, Shannon Schmitt BSc CPR,** Alexis Bloomfield, Scott Burbige, **Laura Brubaker BSc Chem '01, Crystal Bell BSc CPR, Graig Crawford BSc CPR, Wes Butero BSc Eng '98, Tony Post BSc Eng '98, Carol (Holmes) Butero BSc CPR '97,** Frank Spinuzzi. Front row, **Eric Olson BSc CPR '00,** Romana, Sam and Chad Lewis.

Gwenette R. Christiansen MSc Env Sc is a site assessment manager for the U.S. Environmental Protection Agency in Denver.

Jonathan E. Lekawski BSc Geol is a staff engineer for TRC Solutions in Littleton, Colo.

James A. Plutt BSc Pet is a senior associate with Standard and Poors in Houston.

Angela C. Scott BSc Phy is a physics engineer for Raytheon working at Schriever Air Force Base in Colorado Springs, Colo. She is a contractor working on the Ground-Based Midcourse Defense System.

Jason S. Spears BSc Eng owns Acoustic Coffee Lounge in Colorado Springs, Colo.

2000

Brian A. Armstrong BSc Eng is an operations engineer for South Carolina Electric & Gas on Beech Island.

Kim D. Blair BSc Eng is a highway design engineer for the HNTB Corp., in Kansas City, Mo.

Tyson S. Foutz BSc Pet is a special services engineer for Cudd Pressure Control in Oklahoma City.

Paul R. German BSc Eng is a test engineer for Caterpillar, Inc.

John R. Gregg BSc Geol, BSc Econ is an engineer and financial analyst for Avery Dennison Inc., in Waltham, Mass.

Diana L. Harris MSc Env Sc is a risk assessor for Tetra Tech EM Inc., in Denver.

Josephine R. Hernandez BSc Eng is a process engineer for Intel Corp., in Colorado Springs, Colo.

Ivory M. Jackson BSc Eng is a senior engineer for Energy & Resources Consulting Group LLC in Denver.

Lee L. Johnson BSc Eng is a CSM graduate student.

Robert C. L. Lee M Eng Geol is a geologist for the U.S. Geological Survey in Denver.

Brian M. Meachum BSc Eng is a process engineer for Genesis Cable System in Pleasant Prairie, Wis.

Matthew S. Mitchell BSc CPR is a senior process technician at Atmel Corp., in Colorado Springs, Colo.

Mark C. Moon BSc Eng is an associate engineer for BJ Services Company in Alice, Texas.

Micaela Reddy PhD CPR is a postdoctoral trainee at Colorado State University in Fort Collins.

Nicholas B. Rohrdanz BSc Met & Material Engineering is a plating metallurgist for Dana Corp., in Atlantic, Iowa.

Jennifer S. Shane BSc Eng is a graduate student at University of Colorado—Boulder.

John Robert West BSc Geol is an environmental scientist with RM CAT Environmental Services Inc. in Denver.

Laura A. Westler BSc CPR is a petroleum engineer for BP in Houston.

Ann T. Whealan MSc Env Sc is a hydrology intern for ECO/USGS.

Sara A. Williams BSc Eng is a quality engineer at Motorola Inc.

n the move

2001

2nd Lt. Eric E. Aguilar BSc Chem Eng is a program manager in the U.S. Air Force in Bedford, Mass.

Salem Saad Al-Ghamdi BSc Chem Eng, BSc Math & Comp Sci is a loss-prevention engineer for Saudi Aramco Company in Najmah, Ras Tanura, Saudi Arabia.

Erin L. Anderson BSc Pet is a reservoir engineer for Tom Brown Inc., in Denver.

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Nezhone Uilani Bandmann BSc Pet is an engineering technician for Redstone Resources Inc., in Denver.

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Courtney D. Cadice BSc Eng is a civil engineer for HDR Engineering Inc., in Denver.

Patrick S. Calvert BSc Eng is an engineer with Michael Kirkham.

Charles K. Craig MSc Env Sc is a staff environmental engineer for Versar Inc. in Northglenn, Colo.

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Daniel P. Flaherty BSc Eng is a CSM graduate student.

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Aaron G. Gabler BSc Math & Comp Sci, BSc Econ is owns Gabler Consulting Services in Golden, Colo.

Jeffrey M. Gross BSc Eng is an associate pipeline engineer for Conoco Inc., in Houston.

Thais A. Guirigay MSc Geol is a geophysicist for PDVSA EyP in Maracaibo, Venezuela.

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Hamid Nazeri PhD Min is rock-mechanics division manager for Advanced Terra Testing in Lakewood, Colo.

Jessica Jordet Noffsinger BSc Chem teaches math and science at Thornton (Colo.) Middle School.

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Zachary D. Pike BSc Eng is an electrical engineer for Raytheon Company in Aurora, Colo.

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Christopher M. Reidinger BSc Eng is an electrical engineer for the Bureau of Reclamation in Denver.

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Sean T. Rooney BSc Eng is an engineer for TDA Research.

David E. Schmidt BSc Chem Eng is an associate senior manufacturing engineer for Thiokol Propulsion.

Jared Severson BSc Eng completed Office Candidate School at Naval Aviation Schools Command in Pensacola, Fla., and received his commission.

Schaun M. Smith MSc Env Sc is a CSM graduate student.

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Student Papers: A Window into Life at Mines More than 100 Years Ago

By Robert Sorgenfrei

Over at the I-Club in the Student Center is a large photograph of some Mines students surveying in a field. From their dress it is obvious that this photograph was taken a long time ago. Over the years, this photograph has attracted a lot of interest, but few people know who these students were or where the photograph came from. The person third from the left at the surveyor's transit is William Magenau, class of 1898, and the photograph came from his papers in the Archive. When looking at the history of an institution such as Mines, it's easy to see the forest, but not always the trees. The past is sometimes seen in the buildings, the official records, and in photographs of past events. But what of the individuals — faculty, staff, and students — who each contributed to the larger history of the school? These individuals can easily be forgotten unless they have left something of themselves behind. The Archive is fortunate to have some of the personal papers of William Magenau. These papers shed light on student life more than a century ago.

William Magenau, center, graduated in 1898. His thesis is in the Mines Archive

Magenau was born in Fremont, Neb., in 1877. After completing only two years of high school, he gained admission to Mines in the fall of 1893. Prior to 1893, many Mines students were interested in taking only a few assaying and mining courses, dropping out once they had sufficient training to get employment in the mining industry. By 1892, the last of the "special students" (non-degree seeking) had left. Students were now willing to attend Mines for a full four years. Magenau was one of this new generation of students.

The Archive has copies of letters he wrote home detailing his experiences. Typical of most students at the time, he lived in a boarding house in Golden, as there were no dorms on campus. We can tell from a map he drew that the boarding house was on 13th Street, next to the Episcopal Church. He must have had engineering in his blood because in one letter he diagrammed his room to scale, carefully measuring its dimensions and the size of each piece of furniture.

Magenau was a freshman in the fall of 1893 and wrote his family of his first impressions that September. He wrote that Mines' president, Professor Chauvenet, "improves upon acquaintance." He characterized his mathematics professor, Paul Meyer, as "eccentric," keeping his hair long and combing it only once a year. Magenau wrote that Meyer could perform complex mathematic calculations in his head so fast that students could not follow him. Judging from the exam papers we have in the Archive, Magenau did quite well academically: most of the exam papers had scores in the 90s. During the 1896-97 school year, Magenau left Mines to work as chief chemist and assayer in a sampling works in Silverton. He returned to Mines the fall of 1897 and resumed his schooling, graduating with the class of 1898, the same class that graduated the first woman, Florence Caldwell Jones. As part of his graduation requirement, Magenau wrote a thesis, or memoir as they were referred to, on a subject assigned by the faculty with "direct reference to the practical end the student has in view in his course of study." The title of Magenau's thesis was "The Determination of Gold in Cyanide Solutions." This thesis is the earliest surviving example we have of a student thesis at Mines.

After graduation in 1898, he became a chemist and assayer for the Geyser-Marion Gold Mining Company in Mercur, Utah. He then worked at a number of mining operations throughout the West until in 1906, he became general manager for the National Rubber Company in Gomez Palacio, Durango, Mexico. This operation manufactured crude rubber from the guayule shrub. In 1913, when the Mexican Revolution made it too dangerous, he relocated to the Grand Junction area where he planned to work on an irrigation project with fellow alumnus Ed Platt, class of 1900. In May of 1913, Mageneau was hospitalized with pneumonia and died July 8, 1913, thus a promising career ended. He was eulogized in *Mines Magazine* in and was described as having "quiet dignity and splendid character."

Although Magenau died young, his memory lives on at Mines due to the generosity of his daughter, Louise Korol, who donated his papers to the Archive in 1991. The William Magenau Papers, aside from being interesting documents on the early history of the school, raise a serious issue. Magenau lived in a time when the art of letter writing was flourishing. True to his era, he wrote many literate, descriptive letters that give us a window into his world. Because his family saved and treasured them, the letters survive to the present day. What will we in this age of communication by phone and email pass on to future generations? Our electronic communications are far more ephemeral than paper and are gone with the click of a mouse.

Robert Sorgenfrei is librarian/archivist of the Russell L. & Lyn Wood Mining History Archive, Arthur Lakes Library.

ATTENTION FORMER "STUDENT" WIVES
(and former student husbands, too!)

I WANT YOUR MARRIED COLLEGE YEARS STORIES!!

I want your stories for a book about the funny experiences we had as the wives (or husbands) of college students at Mines. Most former student spouses have wonderful tales of their married years at Mines. My desire is to get enough material to keep the book's focus on CSM experiences only, particularly with the engineering perspective in mind. I'm primarily looking for funny stories, but if you had any interesting or poignant experiences during your years at Mines, or have observations you think may be appropriate to a book such as this, I'd love to see them.

Also please provide the following additional background information.

- your spouse's major and year of graduation
- was spouse undergrad or grad student at the time
- where you were living (which set of married student units or what area, town and/or part of town your apartment or house was in)
- information on children you had during the school years, especially if it pertains to the story(ies)
- if and where you and/or your spouse were working
- any other information you feel may be useful and/or pertinent to the story

Feel free to contact me if you have any questions. Please send your stories and contact information (name, address, phone number, e-mail address) to me at the following snail-mail or e-mail address:

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1/2 page	7 1/2" x 4 7/8" or 4 7/8" x 7"	650	620 ea.	595	600	550
1/3 page	2 3/8" x 10" or 4 7/8" x 4 7/8" or 7 1/2" x 3 1/4"	500	477 ea.	458	400	350
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1/6 page	2 1/4" x 4 7/8"	360	300 ea.	286	200	150

*Directory is printed in black and white only.

Colorado School of Mines
Alumni Association
P.O. Box 1410
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Mines muscles its way to a fantastic finish in international competition. Eighteen CSM students recently competed in the Intercollegiate Mining Games in Kalgoorlie, Australia. This group of CSM women finished third place overall in the competition.

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